1251 rare

T: Text Book of Deductive Logic

A: Bholo nath Ray

ಪರಾಮರ್ಶನ ಗ್ರಂಥ
Acc. No; 037548
ಅಕ್ಷರ ಗ್ರಂಥಾಲಯ
ಕನ್ನಡ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಹಂಪಿ
ವಿದ್ಯಾರಣ್ಯ

1938

1251–1260

62
RAY

ಗ್ರಂಥಾಲಯ
ಕನ್ನಡ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಹಂಪಿ
ವಿದ್ಯಾರಣ್ಯ.

Recommended by the Calcutta, Dacca and Benares Hindu Universities.

TEXTBOOK OF
DEDUCTIVE LOGIC

WITH COPIOUS EXAMPLES AND QUESTIONS

BY

BHOLA NATH ROY, M.A.

LECTURER, POST-GRADUATE DEPARTMENT, CALCUTTA UNIVERSITY;
SENIOR PROFESSOR OF PHILOSOPHY, RIPON COLLEGE, CALCUTTA;
EXAMINER, CALCUTTA UNIVERSITY; PAPER-SETTER AND EXAMINER,
DACCA UNIVERSITY AND BENARES HINDU UNIVERSITY;
SOMETIME PROFESSOR OF LOGIC AND PHILOSOPHY,
SCOTTISH CHURCH COLLEGE, CALCUTTA; AUTHOR OF
Textbook of Inductive Logic.

WITH A

FOREWORD

BY

DR. ADITYANATH MUKHERJEE,

M.A., P.R.S., PH.D., I.E.S. (Retd.), *Darsan-Sagar.*

GEORGE V. PROFESSOR OF PHILOSOPHY, CALCUTTA UNIVERSITY;
XAMINER AND PAPER-SETTER IN LOGIC, CALCUTTA UNIVERSITY;
TRAR, CALCUTTA UNIVERSITY; PRINCIPAL, SANSKRIT COLLEGE,
LCUTTA; SENIOR PROFESSOR OF LOGIC AND PHILOSOPHY,
PRESIDENCY COLLEGE, CALCUTTA, ETC., ETC.

Sixth Edition

J. C. BANERJEE,
15, COLLEGE SQUARE, CALCUTTA
1938

(*All rights reserved by Author.*)

Published by the Author
24, Harrison Road, Calcutta.

ಡಾ—೯೯
ಖಂಡ 3

ಸೇರ್ಪಡೆ ಕ್ರಮಾಂಕ 037548
ದಿನಾಂಕ 31.10.1998

162
Roy

Printed by J. C. Ghosh
BHARATI PRINTING WORK
107, Vivekananda Road, Calcutt

[illegible]

[illegible] Sir
Dharwar.
Dodmani V.G.
Dharwar

FOREWORD

Professor Bholanath Roy was a most brilliant and thoughtful student of my Philosophy class when I was on the staff of the Presidency College. It was therefore with considerable interest that I perused his "*Textbook of Deductive Logic*", and "*Textbook of Inductive Logic*", and my expectations were amply justified. An experienced teacher of the subject, Professor Roy has presented the essentials of the subject in a manner at once clear and concise and refrained from a more elaborate treatment of certain topics which at the initial stage are likely to perplex and discourage students. A very welcome feature of the books is the wealth of illustrations and their value is further enhanced by the insertion in appropriate places of University Questions. The Chapter on Fallacies will be found very helpful. The books are intended to help students to prepare for University examinations and this object they fully achieve. A student who carefully mast these little volumes s ped for the ordeal of e

AKSHARA GRANTHALAYA
ACC.NO. 037548

SENATE HO
Calcutta June 24,

MUKHERJEE.

Dharwar.

PREFACE TO THE FIRST EDITION.

THIS little treatise has grown out of lectures on Logic delivered by the author to undergraduate classes in different colleges, and as its name implies, is designed mainly for the use of students, newly entering upon the study of this comparatively difficult subject. Being primarily intended as a text-book for junior students, it comprises no more than the elements of the subject, but while avoiding too much burdensome detail tending to confuse the beginner, an attempt has been made to avoid the other extreme of presenting a bare skeleton shorn of flesh and blood.

During the author's experience as a teacher, extending over more than a decade, he has felt that the real difficulty of the student is not so much the understanding of the principles as the practical application of these principles to concrete cases. With a view to meeting this difficulty, copious examples have been given, illustrating the principles of the science and as far as possible, fallacies arising out of the violation of logical rules have been exhaustively dealt with in chapters dealing with the rules themselves. It is hoped that the true meaning of the logical rules would become clearer and more striking when they are set over against errors resulting from their violation.

In compiling this volume, the author has been under obligation to all the standard writers on the subject and it is not necessary to enumerate the various books, to which he has been indebted. In the preparation of the manuscript, in reading the proofs and in various other ways, the writer has received invaluable aid from Professor Manindra Nat Banerjee, M.A. (Gold Medalist), Professor of Philosoph Scottish Church College, Calcutta, Mr. Rabindra Nat Mukherjee, M.A., B.L., and from Professor Gopal Chandr Bhattacharya, M.A., Professor of Philosophy, Brojomohu College, Barisal, to whom he offers his grateful thanks.

Suggestions from teachers for the improvement of the boo will be thankfully accepted.

CALCUTTA,
June 25, 1930.
THE AUTHOR.

PREFACE TO THE FIFTH EDITION.

In the present edition, only slight verbal alterations hav been made here and there throughout the book. The sectio containing Questions and Exercises have, however, bee thoroughly revised and in this work of revision, I hav received much valuable assistance from Professor Harid Chaudhuri, M.A. (Gold Medalist) of the City College, Calcutt to whom my thanks are due.

CALCUTTA,
June 25, 1937.
THE AUTHOR.

PREFACE TO THE SIXTH EDITION.

In this edition, the first three chapters have been thorough revised and rewritten, and the *Exercises* have been rearrang throughout.

CALCUTTA,
August 11, 1938.
THE AUTHOR.

CONTENTS

CHAPTER I.

DEFINITION AND SCOPE OF LOGIC.

PAGES.
ec. 1. Introductory—What is Logic? 1
ec. 2. Knowledge and its Sources 5
ec. 3. Forms of Knowledge—Immediate and Mediate . . 7
ec. 4. Thought: 9
Note 1. Formation of Concepts 11
Note 2. Nature of Concepts: Realism, Conceptualism and Nominalism 12
ec. 5. Thought and Language: Logic and Grammar . . . 13
ec. 6. Form and Matter of Thought 15
ec. 7. Formal and Material Truth 17
ec. 8. Science: 19
Note. Sciences, Positive and Normative 21
ec. 9. Science and Art 22
ec. 10. Definition of Logic 23
Note 1. Formal and Material Logic 25
Note 2. Scope of Logic 28
ec. 11. Logic as a Science and an Art 28
ec. 12. Various Definitions of Logic 30
ec. 13. Utility of Logic 32
ec. 14. Logic and Psychology 35
Note. Logical and Psychological treatment of Thought . 36
ec. 15. Logic and Metaphysics 37
Exercise I 39

CHAPTER II.

THE FUNDAMENTAL PRINCIPLES OF DEDUCTIVE LOGIC.

ec. 1. Nature of the Fundamental Principles 41
ec. 2. The Fundamental Principles or the Laws of Thought . . 42
I. The Law of Identity 42
II. The Law of Contradiction 43
III. The Law of Excluded Middle 44
Note. Mutual relation of the three Laws of Thought 46
IV. The Law of Sufficient Reason (Leibnitz) . . . 47
Note. Hamilton's Postulate 47
Exercise II 48

CHAPTER III.

TERMS.

ec. 1. Words and Terms: Categorematic and Syncategorematic Words 49
Note. Does the Chapter on Terms form a part of Logic? 52

PAGES.
Sec. 2. Denotation and Connotation of Terms 53
Note. Kinds of Connotation 57
Sec. 3. Divisions of Terms 57
A. Simple and Composite Terms 58
B. Singular and General Terms 59
C. Collective Terms and Non-collective Terms : Collective and Distributive uses of terms 61
D. Concrete and Abstract Terms 62
E. Positive, Negative and Privative Terms : Infinite Terms 64
Note. Opposition in Terms : Contradictory and Contrary Terms 66
F. Absolute and Relative Terms 67
G. Connotative and Non-connotative Terms . . . 68
Exercises Worked Out 73
Exercise III 74

CHAPTER IV.

THE PREDICABLES.

Sec. 1. The Five Predicables : Genus, Species, Differentia, Proprium, Accidens 77
Sec. 2. Tree of Porphyry 82
Exercises Worked Out 83
Exercise IV 84

CHAPTER V.

DEFINITION: ITS LIMITS AND FORMAL CONDITIONS.

Sec. 1. Nature of Definition 85
Note. Definition and Description : their relation to the Predicables 86
Sec. 2. Rules of Definition and their violations leading to Fallacies . 87
Sec. 3. Limits of Definition 91
Exercises Worked Out 92
Exercise V 93

CHAPTER VI.

LOGICAL DIVISION.

Sec. 1. Nature of Logical Division 95
Note. Division and Definition 96
Sec. 2. Rules of Logical Division and their violations leading to Fallacies 97
Sec. 3. Division by Dichotomy 100
Exercises Worked Out 101
Exercise VI 102

CHAPTER VII.

PROPOSITION.

PAGES.
Sec. 1. Analysis of a Logical Proposition 103
Note. Grammatical Sentence and Logical Proposition . 106
Sec. 2. Kinds of Propositions 106
A. Simple and Compound 106
B. Division according to Relation—Categorical and Conditional 107
C. Division according to Quality—Affirmative and Negative 109
Note 1. Quality of Hypothetical Propositions . . 109
Note 2. Quality of Disjunctive Propositions . . 110
D. Division according to Quantity—Universal and Particular 110
Note 1. Singular Propositions 112
Note 2. Universal Propositions 112
Note 3. Quantity of Hypothetical Propositions . . 113
Note 4. Quantity of Disjunctive Propositions . . 113
E. Division according to Modality—Necessary, Assertory and Problematic 113
F. Division of Propositions according to Import : Verbal and Real 114
Sec. 3. Simplification of Propositions : Forms of Propositions according to Quality and Quantity—A. E. I. O. . . 116
Sec. 4. Reduction of Sentences into their logical form of Propositions 116
Sec. 5. Distribution of Terms 123
Note. Quantification of the Predicate 124
Sec. 6. Representations of the four kinds of Propositions by means of Diagrams : Euler's Circles 125
Hints for Working Out Exercises 126
Exercises Worked Out 127
Exercise VII 130

CHAPTER VIII.

IMPORT OF CATEGORICAL PROPOSITIONS AND THEORIES OF PREDICATION.

Sec. 1. Theories of Predication 133
Sec. 2. The Nominalist, the Conceptualist and the Realist theories of the Import of Propositions 135
Exercise VIII 136

CHAPTER IX.

OPPOSITION OF PROPOSITIONS.

Sec. 1. Different forms of Opposition 137
A. Subalternation 137
Note. Is Subalternation a form of Opposition ? . 138
B. Contrariety or Contrary Opposition 138

C. Sub-Contrariety or Sub-Contrary Opposition

D. Contradictory Opposition

Sec. 2. The Square of Opposition

Exercise IX

CHAPTER X.

IMMEDIATE INFERENCE.

Sec. 1. Inference in general: Deductive and Inductive: Immediate and Mediate

Sec. 2. Conversion

Note 1. Can an A proposition be converted simply?

Note 2. Conversion by Negation

Note 3. Inference by Converse Relation

Sec. 3. Obversion

Note. Material Obversion

Sec. 4. Contraposition

Note 1. Contraposition as a compound form of Immediate Inference

Note 2. The Contrapositive is different from the Obverted Converse

Sec. 5. Inversion

Note. Table of Comparison of the four principal forms of Immediate Inference

Sec. 6. Opposition

Sec. 7. Modal Consequence

Sec. 8. Change of Relation

Sec. 9. Inference by Added Determinants

Sec. 10. Inference by Complex Conception

Exercises Worked Out

Exercise X

CHAPTER XI.

SYLLOGISM.

Sec. 1. Definition of Syllogism—its characteristics

Sec. 2. Structure of Syllogism

Sec. 3. Kinds of Syllogism

Sec. 4. Canons or Fundamental Principles of Pure Syllogism

Sec. 5. Aristotle's *Dictum de omni et nullo*

Sec. 6. Lambert's Canons

Sec. 7. General Rules of Categorical Syllogism and their violations leading to Fallacies

Sec. 8. Figure of Syllogism

Sec. 9. Mood of Syllogism

Sec. 10. Determination of Valid Moods

I. Valid Moods of First Figure

Note 1. Special Rules of the First Figure

Note 2. Special characteristics of the First Figure

PAGES.
II. Valid Moods of Second Figure 205
Note. Special Rules of the Second Figure . . 208
III. Valid Moods of Third Figure 209
Note. Special Rules of the Third Figure . . . 211
IV. Valid Moods of Fourth Figure 212
Note. Special Rules of the Fourth Figure . . 214
c. 11. Reduction : Direct and Indirect 215
Note. Is Reduction necessary? 217
ec. 12. The Mnemonic Lines 218
Sec. 13. Direct Reduction of Imperfect Moods 220
Sec. 14. Indirect Reduction of all Imperfect Moods . . . 222
Sec. 15. Fundamental, Weakened and Strengthened Syllogisms . 233
ec. 16. Pure Hypothetical and Pure Disjunctive Syllogisms . . 238
Exercises Worked Out 239
Exercise XI 245

CHAPTER XII.

MIXED SYLLOGISMS.

Sec. 1. Hypothetical-Categorical 250
A. Rules 250
B. Fallacies 252
C. Reduction to Categorical form 253
Sec. 2. Disjunctive-Categorical Syllogism 254
Sec. 3. Dilemma 255
A. Structure of Dilemma 255
B. Forms of Dilemma 256
C. Rebutting a Dilemma 259
D. Testing a Dilemma 261
Formal correctness of a Dilemma 261
Material correctness of a Dilemma 263
Exercise XII 265

CHAPTER XIII.

ABRIDGED SYLLOGISMS: ENTHYMEME.

Sec. 1. Enthymeme 269
Exercise XIII 270

CHAPTER XIV.

COMPOUND SYLLOGISMS OR TRAINS OF REASONING: PROGRESSIVE AND REGRESSIVE.

c. 1. Progressive and Regressive trains of Reasoning . . 271
Exercise XIV 273

CHAPTER XV.

ABRIDGED PROGRESSIVE TRAINS OF REASONING—SORITES: ABRIDGED REGRESSIVE TRAINS OF REASONING—EPICHEIREMA.

PAGES
Sec. 1. Sorites 274
Sec. 2. Kinds of Sorites 275
Sec. 3. Rules of Sorites 278
Sec. 4. Epicheirema 280
Exercise XV 283

CHAPTER XVI.

MILL'S OBJECTIONS TO THE SYLLOGISM.

Sec. 1. Mill's Twofold Objection 28
Exercise XVI 288

CHAPTER XVII.

FALLACIES IN DEDUCTIVE REASONING.

Sec. 1. Definition of Fallacy: Its Classification 289
Sec. 2. Deductive Fallacies 291
I. Formal Inferential Fallacies—Fallacies of Immediate Inference and Mediate Inference 29
II. Semi-Logical Fallacies 29
(1) Equivocation 292
(2) Paronymous Terms 292
(3) Accident 293
(4) Amphibology . . . .
(5) Accent . . . .
(6) Division and Composition . . . . . .
Hints for working out Exercises on Fallacies with Typical Examples 296
Exercises Worked Out 301
Exercise XVII 33
SYLLABUS IN DEDUCTIVE LOGIC 340
BIBLIOGRAPHY 350
INDEX 351

Textbook of Deductive Logic

CHAPTER I.

DEFINITION AND SCOPE OF LOGIC.

Sec. 1.—Introductory—What is Logic?
Sec. 2.—Knowledge and its Sources.
Sec. 3.—Forms of Knowledge—Immediate and Mediate: Is Logic concerned with Immediate Knowledge?
Sec. 4.—Thought:
  Note 1. Formation of Concepts.
  Note 2. Nature of Concepts: Realism, Conceptualism and Nominalism.
Sec. 5.—Thought and Language: Logic and Grammar.
Sec. 6.—Form and Matter of Thought.
Sec. 7.—Formal and Material Truth.
Sec. 8.—Science:
  Note. Sciences, Positive and Normative.
Sec. 9.—Science and Art.
Sec. 10.—Definition of Logic.
  Note 1. Formal and Material Logic.
  Note 2. Scope of Logic.
Sec. 11.—Logic as a Science and an Art.
Sec. 12.—Various Definitions of Logic.
Sec. 13.—Utility of Logic.
Sec. 14.—Logic and Psychology.
  Note. Logical and Psychological treatment of Thought.
Sec. 15.—Logic and Metaphysics.
  Exercise I.

Sec. 1. Introductory—What is Logic?

In beginning the study of any science, it is but natural that the student should expect to have an idea what he is going to study. What is Logic? is its subject-matter? What is the method of ng it? How is the science related to kindred nes of knowledge? These are undoubtedly very nent questions to ask. It is, however, extremely difficult to supply the answers at this stage. Yet the

Difficulties of formulating a rigorous definition at the beginning.

difficulty is not peculiar to the science of Logic. It is a difficulty which confronts us whenever we attempt to learn anything new for the first time. It has its analogue in the perplexities of the parent incessantly plied with questions by the little child. The fond parent is in a veritable fix. In his heart of hearts he realises his duty to gratify the child's curiosity but he feels his inability to do so. He is simply unable to construct out of the very meagre stock of the child's knowledge the necessary materials for the explanation of these problems. An unwise parent in his exasperation would probably blurt out "How can you *know* without *knowing ?"* and imagine that he has said something very clever and profound. If he is more considerate, he will be tempted to imitate Sir William Jones's mother and say "Read and you will know." The impatient exclamation and the conciliatory exhortation alike are confessions of failure to meet the child on its own ground. From the nature of the case, it cannot but be so. The writer of a text-book on Logic and the teacher of the subject are in a similar predicament. How can an adequate and accurate definition understandable to the beginner be formulated before the latter has familiarised himself with the subject itself? The student on his part would naturally grumble and refuse to be led into the dark. The position is desperate in all conscience. The beginner can, however, be met half-way. A rigorous definition may not be possible but a provisional description of the nature and purpose of the science should be attempted at the very outset.

Etymology of the word.

The word "Logic" is derived from the Greek adjective *"Logike"* corresponding to the Greek noun *"Logos"*, which means either 'thought' or 'word as the expression of thought'. The use of the same word 'Logos' to denote both 'thought' and 'word' emphasises the close relation between thought and its expression in language. Hence etymologically, *Logic is the science of thought as expressed in language.* The word 'thought' is familiar enough and every one knows in a general way what thinking means. Thinking is the act of the mind by means of which knowledge is obtained. But because the expression is a familiar one and we have a vague idea of its meaning, it is by no means an easy expression, as we shall find when we seek to gain a clear idea of what it means. (See Sec. 4 of this Chapter). For the purposes of a general description, however, the simpler word 'reasoning' may be substituted for 'thought', and it may be said that *Logic is concerned with Reasoning as expressed in language and with certain subsidiary processes.* Let us attempt to understand this provisional definition.

Logic is the Science of Thought.

Logic is the Science of Reasoning.

Reasoning means passing from something known to something unknown. The 'something known' constitutes the data or materials of reasoning while the 'something unknown' is the conclusion at which we arrive by reasoning. A child is born; we reason and come to the conclusion that it will die. The child may be fortunate enough to pass through all the traditional Seven Ages of Man but sooner or later it dies. The birth of the child and the fact that man is mortal constitute the data of reasoning, and from these data we conclude that the child will die. Fully expressed, the reasoning will appear as follows:—

Reasoning means passing from known to unknown.

All human beings are mortal
The child is a human being
∴ The child is mortal

To take another illustration: the traveller finds the sky is overcast with clouds and there are flashes of lightning; from this he reasons that he should hasten to find shelter from the imminent rain. Reasoning thus is a kind of indirect knowledge based on some direct knowledge. In order to understand fully what Reasoning is we must understand the meaning of such expressions as "knowledge," "direct knowledge" and "indirect knowledge." These expressions will be explained in Sections 2 and 3 of this Chapter.

Reasoning may be correct or incorrect; hence Logic deals with Truth.

Now Reasoning may be *correct* or *incorrect*. The unknown is notoriously uncertain. The impending rain may not materialise at all when a sudden nor'wester chases the clouds away. In this case the reasoning is found to be incorrect or false. Hence the all-important question in connection with Reasoning is the question of *Truth* or Falsity. Logic being concerned with Reasoning must, therefore, deal with the nature and conditions of Truth. (See Section 7 of this Chapter).

Logic deals with terms, propositions and reasonings and

Further if we analyse a concrete piece of reasoning we find that it consists of '*propositions*' which roughly correspond to what are called 'Sentences' in Grammar. In the first illustration given above, there are three propositions *viz.*, "All human beings are mortal," "The child is a human being" and "The child is mortal." Thus in dealing with Reasoning, Logic deals with *propositions*. Propositions, in their turn, may be analysed into '*terms*,' which roughly correspond to what are called 'words' in Grammar. In the proposition "All human beings are mortal," "human beings" and "mortal" are terms. Hence it is customary to treat of Terms and Propositions as well as of Reasoning in Logic. No doubt Logic is primarily concerned with Reasoning but it is also concerned with Terms and Propositions as necessary constituents of Reasoning proper. This is why the doctrines of Logic are usually expounded under three main heads, *viz.*, the doctrine of Terms, the doctrine of Propositions and the doctrine of Reasonings.

certain subsidiary processes.

Besides the above, Logic deals with certain processes subsidiary to Reasoning proper, *viz.*, Definition, Division, Naming, Classification, etc., the nature of which will be explained in their proper places.

Sec. 2. Knowledge and its Sources.

What is Knowledge?

What is Knowledge? *Knowledge is a system of ideas, corresponding to a system of things, and involving a belief in such correspondence.* Knowledge thus involves three elements, viz., (*i*) there is a system of *ideas* in the mind; (*ii*) these ideas correspond to *things actually existing;* and lastly, (*iii*) there is *belief* in such correspondence. To take a simple example: when we say we know the Sun, we mean that we have in our mind the idea of a heavenly body, of enormous size, dazzling brilliance, round which the planets revolve, that corresponding to this idea in the mind, there is the Sun actually existing; and lastly, we believe that it exists. If any of these three elements be wanting there would be no knowledge.

Illustrations from every-day life.

We all understand in a general way what is meant by Knowledge. We see a flash of lightning and *know* there is light. We hear a peal of thunder and we *know* the sound. We taste a mango and *know* it is sweet. We smell a rose and *know* it is fragrant. We touch a lump of ice and *know* it is cold. What we see, hear, taste, touch and smell, we *know*. Again, we *know* what is passing in our mind at a particular point of time. We *know* we are joyous, we are sorry, we are angry, we are jealous. All these things we know *directly*. Not only this: in the morning we rise from our bed, find the ground wet, the sky cloudy, particles of water trickling down the leaves of trees and we *know* there was rain during the night when we had been asleep. We see smoke and we *know* there is fire. We see a man's face beaming with smiles and we *know* he is full of joy. We see a dog wagging its tail and we *know* it is joyous. Further still, we *know* the earth is revolving round the sun, though it appears stationary. We *know* there is a place called Iceland though we had never been there. We *know* in ancient Greece, long long before we were born, there was a great philosopher named Socrates. Thus we not only know things which we *directly perceive* or apprehend but also those things which we believe to be existing on the strength of our own *reasonings* or on the *testimony* or *authority* of others.

Sources:

Sources of Knowledge: The sources of Knowledge are *Immediate Apprehension, Inference, Testimony* and *Authority.*

(*a*) Immediate Perception of external objects and mental states.

(*a*) **Immediate Apprehension** is the act of the mind by which we become directly aware of something. This direct knowledge may arise from External or Internal Perception. In *External Perception,* we directly know by the exercise of our sense-organs (the eye, the ear etc.) that external objects exist outside of us, and possess qualities. We see the Sun and directly know that it exists and possesses the quality, brightness. In *Internal Perception* (also called *Introspection*), we directly know the states of our own mind, *e.g.,* our joys and sorrows. Thus External Perception and Internal Perception are sources of *immediate* or *direct* knowledge.

concluding

(*b*) Inference from immediate perception

(*b*) **Inference** (or *Reasoning*) is another source of knowledge. In Inference, from certain materials or data which are given, we pass on to something which is not given, but which can be known through and with the help of the given materials. The data or materials of Inference are supplied by Immediate pprehension. For examples: We see smoke and now there is fire; we see a man smiling and know he joyous.

(*c*) **Testimony and Authority:** *Testimony* eans the evidence of reliable persons. The range of ersonal experience and inferences from personal experience, is extremely limited. Even the ordinary xigencies of an average life require that we must step eyond these circumscribed limits—not of course ashly or negligently, but with care, caution and cirumspection. We do not believe the first man in the treet that comes; we examine his credentials, satisfy urselves as to his good faith, interrogate him as to he extent of his investigations, and in various ways xamine the reliability of his evidence. *Authority* mplies power to influence opinion and induce belief. his power may be exercised by an individual, object r institution, held in great veneration and esteem; or example, the authority of our parents and teachers, he Scriptures, religious institutions etc. Knowledge erived from Authority, even more than the knowledge erived from Testimony, should be carefully ested before acceptance inasmuch as the sentiment f veneration may blind our judgment and lead us stray from the path of truth.

(*c*) Testimony or evidence of reliable persons; and

Authority or power to induce belief.

ec. 3. Forms of Knowledge—Immediate and Mediate.

Knowledge assumes two forms, viz., *immediate* nd *mediate*. **Immediate Knowledge** is knowledge erived from Immediate Apprehension, *i.e.*, External nd Internal Perception. External perception gives us mmediate knowledge of the existence of external

Forms of Knowledge: (*i*) Immediate knowledge is derived from immediate perception of external objects and mental states.

objects, *e.g.*, the Sun, the Moon etc., while Internal perception furnishes immediate knowledge of the states of our own mind, *e.g.*, our joys and sorrows. Immediate knowledge is also called *Direct knowledge*.

(*ii*) Mediate knowledge is derived from Inference, Testimony and Authority

Mediate Knowledge (also called Indirect knowledge) assumes several sub-forms, *viz.*, knowledge derived from Inference, Testimony and Authority. *Inference* is Mediate knowledge because in it, we know something not directly, but through and with the help of something given, *i.e.*, through the mediation of something else. Thus when we infer the existence of fire from the presence of smoke, our knowledge of fire is obtained indirectly through the medium of smoke. Knowledge derived from *Testimony* and *Authority* is also Mediate knowledge because it is derived through the mediation of other persons, objects or institutions. The facts of history are known through the testimony of reliable persons who flourished during the period concerned and left accounts of events which they had personally witnessed. Lastly religious men derive their knowledge of God and other supernatural matters on the authority of the Scriptures.

Testimony and Authority are forms of Inference

It may be noted that knowledge derived from testimony and authority is also inferential knowledge because we infer that information derived from reliable persons must be true on the ground that those persons are reliable. At the background of our mind there is a feeling that what is accepted on testimony is true, primarily because if we ourselves had sufficient time, energy and ability to investigate, we ourselves would have arrived at the same results. Only Life is short and Art is long, and the pursuit of knowledge has to be carried on by numerous persons acting in co-operation with one another. Personal verification is not possible even for the most gifted and versatile of men. Every one of us cannot be a chemist, a physicist, a botanist, a geologist, an astronomer

——all rolled into one. We must derive our knowledge of the subject-matter of the different sciences from the recorded results of the investigations of different scientists in their respective fields. Thus knowledge derived from testimony and authority may be included under inferential knowledge.

Not immediate knowledge but mediate knowledge is the subject-matter of Logic.

Is Logic concerned with Immediate Knowledge ? The question has often been asked whether Logic is concerned with Mediate as well as Immediate Knowledge. Logicians are divided in their opinion on this point, but the majority of them maintain that Logic is not concerned with immediate knowledge at all but only with mediate knowledge. According to them, Logic is primarily concerned with the problem of Proof, *i.e.*, in Logic we want to prove the truth of something. Now, so far as immediate knowledge is concerned, in normal circumstances there is no doubt that it is true. Granting that eyesight is normal and unimpaired, what we see must be true. Similarly, in normal individuals, knowledge derived from internal perception of the states of their own minds must be taken to be correct. Hence the question of Proof does not arise in these cases. "No science is required for the purpose of testing the validity of our belief in such truths as these ; no art can possibly render our knowledge of them more certain." But as soon as we step beyond the limits of immediate knowledge to knowledge derived from inference, testimony or authority, the possibility of error creeps in. From the wetness of the ground, we infer that there was rain. This may be true or may be false, and hence arises the problem of truth or falsity. Thus the view that Logic is concerned with mediate knowledge only and not with immediate knowledge appears to be the correct one.

Sec. 4. Thought.

Thought is general knowledge.

Logic is said to be the science of thought as expressed in language. The word **"Thought"** is highly ambiguous. It has been used in various senses. Sometimes "Thought" and "Knowledge" are used as synonymous terms. In Logic however the word "Thought" is used in the sense of "*General Knowledge*." In this sense "Thought" is a sub-division of knowledge. Knowledge may be particular or general, and "Thought" is General Knowledge.

Thought means processes or products of thinking.

Thought or General Knowledge, again, means sometimes the *processes of thinking, viz.*, Conception, Judgment and Reasoning and sometimes the *products of thinking, viz.*, a concept, a judgment and a reasoning.

Concept.

A **Concept** means a *general* idea. We know the difference between the two ideas represented by the terms "Man" and "a man." The term "a man" refers to a particular human being but the term "Man" applies to each and every human being generally and yet to no one of them in particular. The term "Man" is applied to human beings in general because, as a result of comparison of different human beings, we find that some essential attributes are possessed in common by all of them. The common attribute or attributes which are found in every particular individual of the class are thought of separately, and we get a concept. The process of forming general ideas is called *Conception*, and the product is called a *Concept*. **When expressed in language, a Concept is called a Term.**

Judgment.

Judgment is the process of comparing two concepts with each other, and the product of comparison is called *a judgment*. For example, the two concepts or general ideas, "Man" and "Mortal" may be compared with each other, and the product of such comparison is "Man is mortal." **A Judgment when expressed in language is called a Proposition.**

Reasoning.

Reasoning is the process of passing from one or more judgments to another which is justified by them, and the product is called *a Reasoning*. Reasoning thus requires more than one judgment and **when expressed in language is called an Argument.** Thus an Argument consists of more than one proposition. For example:

Premise—All men are mortal.
∴ Conclusion—Some mortals are men.

In an argument we thus proceed from one or more propositions which are given, to another proposition. The proposition or propositions which are given are called the *premise* or *premises*, and the proposition which is drawn from them is called the *conclusion*. The premises are so-called because they are put forward at the beginning, and the conclusion is said to follow or to be concluded from the premise or premises.

We shall see later on that in saying that Logic deals with Thought, we use the word "Thought" to mean both the *processes* and the *products* of thinking.

Note 1. Formation of Concepts.

The question as to how concepts are formed is one which does not belong to Logic but to Psychology. Briefly speaking, the formation of concepts involves the following processes :—

Concepts are formed by

(i) Comparison.

Different individuals or things are *compared* with one another so that it is found that they possess certain attributes in common and they differ in other respects; for example: when we compare different human beings with one another, we find that they agree with one another in possessing the essential attributes—'animality' and 'rationality' while in other respects, *e.g.*, stature, complexion, honesty, intelligence etc., they are different from one another. Thus as a result of comparison, we know what attributes are common and essential as distinguished from what are merely variable and accidental characteristics.

comparing certain individuals,

(ii) Abstraction.

The next step is to *abstract*, i.e., separate the common and essential characteristics from the variable and accidental ones. Our attention is fixed on the former and withdrawn from the latter. Thus the common and essential attributes, 'animality' and 'rationality,' found in all men are considered separately.

separating their essential attributes,

(iii) Generalisation.

The next step is to *generalise* these common and essential attributes, *i.e.*, to show that these attributes are not only to be found in those individuals which we have examined but also in all similar individuals. Thus it is recognised that 'animality' and 'rationality' are not only common and essential attributes of those men who have been examined but of all men.

generalising these attributes, and

(iv) Naming.

The last step is to *give a name* to the generalised group of common and essential attributes. When this is done, it becomes

giving a name to them.

easy to retain the general idea in our mind, to repro when necessary and to communicate it to others. Th generalised group of common and essential attributes the name "Man."

Note 2. Nature of Concepts: Realism, Conceptualism and Nominalism.

Three philosophical views :

The question as to the nature of concepts is o that does not belong to Logic but to Metaphysics. Three different views have been held by philosophers on this question, viz., *Realism, Conceptualism* and *Nominalism.*

According to Realism. Concepts are real things.

Realism is the view according to which corresponding to every Concept, there is a real substance. Thus corresponding to the concept "Man" there exists something which is no man in particular but in which every individual human being participates- *a Universal Man* which consists, as it were, of *man essence* and which is the only real man in existenc This is the view of **Plato** and **Aristotle.**

According to Conceptualism, concepts are general ideas

Conceptualism is the view according to which Concepts are not real things but only general ideas. A concept is the knowledge in the mind of the common and essential properties of the things included under it. The variable and accidental properties of individuals constituting a class are excluded, and the common and essential properties are thought of separately, giving rise to the concept or general idea. The concept 'man' is the general idea of the common and essential attributes possessed by individual men. This is the view of **Locke.**

According to Nominalism, concepts

Nominalism is the view according to which Concepts are merely general names, not general

are general names.

There is no such thing as a *general* idea; all re *particular ideas* of particular things; what neral is only the *name* which is common to all the rticular things. Thus concepts are mere matters words; there are no real things or even general as corresponding to them. The class 'man' raises our mind the idea of a particular man and the ommon or general name 'man.' It is impossible to hink of 'man' without thinking of some particular human being. This is the view of **Hobbes** and **Berkeley.**

Sec. 5. Thought and Language: Logic and Grammar.

Different forms of Language.

The word *"Language"* has been used in various nses. In its widest sense, Language includes e cries, barks, bleatings, roars, and various other articulate sounds which lower animals use. This has een called *"the language of the animals."* In the human kingdom, the simplest forms of language are represented by natural gestures to which a man sometimes resorts in communicating his thoughts to another who is an utter stranger to his native tongue. Gulliver, for instance, when stranded in the strange island of Lilliput could only express the idea that he was hungry by opening his mouth and pointing his finger towards it. But in Logic we are not concerned with these rudimentary forms of language. We are not concerned with the inarticulate sounds of lower animals, or the gestures which men sometimes employ, or even with the signs used by deaf-mutes for the expression or communication of their thoughts. In Logic, **by Language we understand a system of articulate sounds produced by the organs of speech, or a**

Definition of Language in Logic.

system of written words, as symbols of spoken words. Spoken and Written words are both used as instruments of thought and as signs for the communication of thoughts.

The function of language is the expression and communication of thought.

The function of language therefore is the expression and communication of thoughts. Language helps us in analysing complex facts into their simple elements, it helps us in forming concepts or general ideas, it shortens the processes of thought, it is the vehicle or means of communication of thought to our fellow human beings, and written language enables us to record thoughts, so that it may be the channel of communication, not only to other human beings with whom we directly come into contact but also to all persons, of all times and places.

In Logic, there is no thought without language.

The question has sometimes been asked—*Is thought possible without language?* The question however does not properly belong to Logic but to Psychology. It may be possible to have elementary thoughts without spoken or written language, but in Logic, 'thought' means 'abstract or general thought,' and it has never been seriously contended that such thoughts are possible without an elaborate system of language.

Logic and Grammar: The intimate relation between thought and language leads to the consideration of the question as to how Logic, the science of thought is related to Grammar, the science of language. In considering this relation we can have regard only to what is known as *Universal Grammar*, i.e., the science of the universal laws which all languages must observe as opposed to special grammar which is the application of these universal laws to the particular

Universal Grammar deals with laws which are observed nguages. Universal Grammar is the science of the ght use of language. It enquires into the relations f 'the various parts of speech which are essential to language, and investigates into their connections with he thoughts they express. In Grammar we consider he question as to what conditions should be fulfilled n order that the language we use may be correct. ogic is the science of thoughts expressed in language. ence Logic and Grammar are both concerned with anguage. This intimate connection between these two ranches of knowledge has led certain thinkers to take n extreme view and to confound the function of Logic vith that of Grammar. **Whately,** for instance, naintains that mere *verbal consistency* is the sole aim f Logic. This view however is entirely wrong. It s true that both Logic and Grammar are concerned vith Language. But the difference is this. Logic leals with Language only as an instrument and vehicle f Thought, and is thus primarily concerned with houghts and only indirectly concerned with anguage. In Logic we are not interested in the arious distinctions of language on their own account ut only in the thoughts underlying them. Grammar n the other hand, is primarily concerned with anguage.

in all languages.

Both Logic and Grammar deal with language but in different ways.

ec. 6. Form and Matter of Thought.

Every **material object** has a certain *form* or shape, and made of a certain *matter* or material. A gold mohur, for nstance, is round in shape and is made of gold. A table is ound or oval or rectangular in form and is made of wood. hus every such object has some shape or other and is made p of some material or other. There cannot be matter withut any form or a form by itself without matter. Matter nd Form always go together and are found in the same

Form and Matter of material objects.

material object. But it is a familiar fact that the shape of things and the material they are made of may change without affecting each other. Various things made of the same material may have different forms, and again, various things having the same form may be made of different materials. For example, a gold watch may have diverse shapes—round, square, rectangular, hexagonal, octagonal, etc., and on the contrary, a round-shaped watch may be made of gold, silver or nickel. Medals struck from the same die have exactly the same form but they may be made of various materials such as gold, silver, copper, bronze, etc.

Form and Matter of Thought.

Form and Matter of Thought: Just as we recognise a distinction of form and matter in material objects so there is a distinction of form and matter in Thought. *By the matter of thought, we mean the things thought about;* and *by the form of thought, we mean the way in which the mind thinks about them.*

Thoughts expressed in language as dealt with in Logic are Terms, Propositions, and Reasonings. In each of these varieties there is a distinction of form and matter. The *terms* 'white' and 'not-white' are respectively positive and negative in form, while their matter is represented by their meanings. The *proposition* 'All men are mortal' is universal affirmative in form while its meaning constitutes its matter. As for *reasonings*, the following argument

All men are mortal
All kings are men
∴ All kings are mortal

is a syllogism in form while its matter consists of the meanings of the three propositions constituting it.

In the case of thoughts, as in the case of material objects, the form may change while the matter remains the same; and again, the matter may change while the form remains the same. This may be illustrated by taking two sets of propositions. The propositions

All men are mortal ; and
All dogs are quadrupeds

have the same form *viz.*, universal affirmative but they have different meanings *i.e.* their matter is different. On the contrary, the propositions

All men are mortal ; and
No men are immortal

are different in form, the former being affirmative, the latter, negative, but the matter of thought is the same because the propositions have the same meaning.

This may be illustrated also in the case of the other two varieties of thoughts *viz.*, Terms and Arguments.

Sec. 7. Formal and Material Truth.

Corresponding to the distinction of form and matter in thoughts, there arises the distinction between Formal and Material Truth.

Formal Truth *means self-consistency or freedom from self-contradiction.* The question is—Is the thought consistent in itself? Is it free from contradiction within itself? Is the so-called thought a thought at all or a mere word without meaning? The expression 'circular square', for example, is self-contradictory. Not only that such a thing does not exist at all but it cannot even be thought of. It is unthinkable, inconceivable in itself. We need not go out into the world to see it is false. It is false in tself.

Formal Truth means self-consistency.

Material Truth *means correspondence of thoughts with things of the actual world.* If in a

Material Truth means

consistency of thoughts with things.

particular case, we find that the ideas in our mind do not correspond to anything actually existing in the world *i.e.*, our thoughts are contradicted by reality, these our ideas and thoughts are not materially true but false. Thus in vain do we search for a golden mountain, a castle in the air, a sea of milk, a Centaur. These objects are found only in what we call the world of fancy, the world of unreality. They do not exist in the actual world. They are false . On the other hand, when on inferring the existence of fire from the presence of smoke at a distance, we actually cover the ground and find that fire *is* there, our inference is proved to be materially true. Columbus by his calculations inferred that there was another continent in existence, then unknown, he sailed over unknown seas and discovered America. The material truth of his inference was demonstrated. Chemistry teaches that two gases Hydrogen and Oxygen mixed in certain definite proportions produce Water. This information is actually verified to be true when we ourselves make an experiment and find that Water *is* produced by such combination.

Formal and Material Truth of reasonings

Now coming to the question of the formal and material truth of reasonings or arguments, we observe that *an argument is formally true* when in drawing the conclusion the rules of that particular form of the argument have been observed, and *an argument is materially true*, when the propositions constituting it agree with actual facts. Thus the following argument

All men are mortal
All kings are men
∴ All kings are mortal.

is *formally true* because the rules of this form of argument, *viz.*, syllogism have been properly observed;

this argument is also *materially true* because the three propositions constituting it actually agree with facts—all men *are* mortal, all kings *are* men, and all kings *are* mortal.

Formal and Material Truth however do not always go together. An argument may be formally true but materially false, and *vice versa*. The argument

do not always go together.

All men are immortal
All kings are men
∴ All kings are immortal

is formally true because the rules of syllogism have been correctly followed, but materially false because as a matter of fact neither men nor kings are immortal. The converse case is illustrated in the following argument:

No men are perfect
All men are animals
∴ No animals are perfect

This is materially true because all the three propositions are true as a matter of fact, but formally false because the rules of syllogism have been violated leading to the fallacy of Illicit Minor.

Sec. 8. Science.

Science and Popular Knowledge: *A Science is a systematic body of knowledge relating to a particular department of the world.* As distinguished from popular knowledge, a Science presents the following characteristics:

As distinguished from Popular Knowledge, Science

(*a*) A Science deals with *a particular department of the world* within which it confines its investigations while the ordinary man appears to be interested in the whole field of knowledge.

confines itself to one department ;

The average man—the man in the street seems to know something about everything in the world. He knows something about the nature and growth of different kinds of plants, the habits of different kinds of animals, the idiosyncracies of his fellow human beings, the change of seasons, the uncertainty of the weather, of the ebb-tide and the flow-tide, of the eclipse of the sun and the moon, and in fact, his range of knowledge seems to know no bounds but appears to extend to all possible departments of the world. A Science however, is restricted to one particular department of the world. *Botany* is the science of Plant life, *Zoology* is the science of Animal life, *Psychology* is the science of Mind, *Meteorology* is the science of atmospheric changes, *Chemistry* is the science of Matter, *Astronomy* is the science of heavenly bodies and so on. Each of these sciences confines itself within its own department and does not step beyond its self-prescribed limits. It is not true that one department of the world is exclusively cut off from another department and from this standpoint, no science can strictly contain itself within its own sphere. But a science directly deals with its own department and only indirectly deals with other departments, only in so far as the latter exercise some influence on its own subject-matter, with which only it is primarily concerned.

furnishes systematic knowledge ; and

(*b*) Scientific Knowledge is *systematic, unified, organised*, and *co-ordinated* while ordinary knowledge is a jumble of isolated and disconnected facts.

The characteristic of the knowledge of the average man is that it is disconnected and unsystematic. It is a collection of more or less isolated facts, and at most, their mutual connections are only vaguely and imperfectly appreciated. A Science attempts to bring such isolated facts under general laws forming parts of a consistent whole. Science does not refuse individual facts ; on the other hand, it collects as many facts as possible and then seeks to unify them by finding out their mutual relations and interconnections.

employs special appliances.

(*c*) Lastly, a Science employs *special means and appliances* to render knowledge true and exact, while ordinary knowledge trusts to immethodical observations.

In collecting materials of knowledge the ordinary man trusts to the evidence of his sense-organs without criticism and his knowledge is often coloured by his passions and prejudices. The scientist however makes a dispassionate study of facts, and often employs special instruments for testing his knowledge. The astronomer uses a telescope to observe the heavenly bodies; the chemist uses a highly delicate chemical balance for weighing his substances ; the bacteriologist uses a microscope for observing minute bodies, not visible to the naked eye ; and so on.

Science and Popular knowledge differ in degree.

Thus Scientific knowledge and Popular knowledge are not different in kind but only in degree. Scientific knowledge is more specialised, better organised and more exact than ordinary knowledge.

Logic is a Science.

Logic is a *science;* its subject-matter is reasoning and certain subsidiary processes; it proceeds to investigate in a methodical and systematic manner the conditions which must be fulfilled in order that thoughts may be correct, and errors may be avoided and detected. It is therefore superior to popular thoughts and reasonings in being more systematic and more exact.

Note. Sciences, Positive and Normative.

Positive and Normative Science.

Sciences have been classified into positive and Normative. A **Positive Science** *deals with things as they are while a* **Normative Science** *deals with things as they should be.* There is an obvious distinction between things as they are and things as they should be—between the Real and Ideal—between the *is* and the *ought.* For example, a man often knows what he ought to do but as a matter of fact, he behaves differently ; he knows that he ought to tell the truth but often he does not tell the truth. A science which deals with things as they ought to be is a normative science. A normative science is so-called because it sets before itself a *norm* i.e., an ideal. Logic is a normative science, because it deals not with thoughts and reasonings as they are but as they should be. Logic sets before itself the ideal of Truth, and seeks to know the conditions which our thoughts must fulfil in order that the ideal of truth may be attained. The science which deals with thoughts as they are is known as Psychology. (See Sec. 14 of this Chapter.)

Sec. 9. Science and Art.

Science teaches us to know; Art, to do.

A **Science** is a systematic body of knowledge dealing with a particular department of Nature. An **Art** on the other hand teaches us how to apply knowledge to actual practice for the attainment of a certain end. **A Science teaches us to know and an Art teaches us to do.** In fact, *knowing* is ultimately important in so far as it helps *doing*. The final purpose of all knowledge seems to be *Practice* or the guidance of conduct, and there are different departments of practice, according to the various needs of mankind. These departments are called Arts.

Empirical and Scientific Arts.

Thus all Art is based on knowledge. This knowledge may be scientific knowledge or ordinary unsystematic knowledge of the average man. An Art is called *empirical*, if it proceeds solely upon knowledge gained in the exercise of the art itself while an Art becomes *scientific*, when it is based on scientific knowledge. Empirical arts precede scientific arts just as ordinary knowledge precedes scientific knowledge. For example, Navigation. Formerly, sailors were content with such knowledge as they could pick up in course of an actual voyage but now, the art of Navigation is based on knowledge derived from such advanced sciences as Mathematics, Astronomy, Meteorology, Optics, etc.

We shall see later on that Logic is *both a Science and an Art.* It consists of a body of scientific knowledge and at the same time, it teaches us how to apply this body of knowledge to actual practice.

Sec. 10. Definition of Logic.

✓ **Logic may be defined as the science of the regulative laws of valid thought, i.e. to say, the science of the principles to which thoughts must conform in order that they may be valid.**

Science.

A **Science** is a systematic body of knowledge belonging to some particular subject-matter. As distinguished from popular knowledge, a science deals with a particular department of the world and not with the whole field of knowledge; within this particular department, however, a Science attempts to systematise and unify isolated facts and bring them under general laws forming part of a consistent whole. Sciences may be positive or normative according as they respectively deal with things as they are or with things as they ought to be. Logic is a *science;* its subject-matter is reasoning and certain subsidiary processes, and it proceeds to investigate in a systematic manner the conditions which must be fulfilled in order that our thoughts may be correct, and errors may be avoided and detected. It is therefore superior to popular reasonings in being more systematic and exact. Logic is a *normative science,* because it deals not with thoughts as they are but as they ought to be *i.e.*, with correct thoughts. It sets before itself a norm or ideal *viz.*, the ideal of Truth, and seeks to know the conditions which must be fulfilled in order that the ideal of truth may be attained. The use of the word 'regulative' implies that Logic has both a theoretical and a practical side, *i.e.*, it is both a science and an art. The theoretical aspect is implied by the word 'science' and the practical aspect is implied by the word 'regulative'.

Law.

A **Law** is the statement of a general truth; *i.e.*, a truth which holds good universally in that science, as distinguished from a particular truth, which holds good in some cases only. The *regulative principles or laws* are those general truths which underlie all thought *i.e.*, all thoughts must conform to them, and no thought is valid unless it is in accordance with these general truths.

Thought.

The word **'Thought'** is ambiguous and sometimes means the processes and sometimes, the products of thinking. The processes of thinking are *Conception*, *Judgment* and *Reasoning;* the products are *concepts*, *judgments* and *reasonings.* When expressed in language, Concepts, Judgments and Reasonings are respectively called, Terms, Propositions and Arguments. Logic deals both with the processes and with the products of thinking. The word 'thought' also implies that Logic is not only concerned with reasoning but also with certain subsidiary processes of thinking *viz.*, Terms, Propositions, Definition, Classification etc.

Validity, formal and material.

The word **'Validity'** or **'Truth'** is used in two senses. In the narrower sense, Validity is identified with *Formal Truth* or self-consistency, and in this sense, thought is valid, when it is consistent with itself and does not involve any self-contradiction. In the wider sense, Validity implies not only formal truth but also *Material Truth*, or consistency of thoughts with things and therefore, thought in order to be valid must not only be free from self-contradiction but also agree with actual facts of the world. There is a controversy amongst logicians as to whether Logic is concerned merely with Formal Truth or also with Material Truth. Formal Logicians *e.g.*, Hamilton, Mansel etc. maintain that Logic is concerned merely with the formal laws of thought, thus identifying Logic with Formal Logic only. Material Logicians point out that this is taking too narrow a view of the scope of Logic. Truth is essentially one; formal truth and material truth are not two different kinds of truth but only two aspects of the same thing. For the convenience of treatment, they are dealt with separately, but truth being essentially one, the different topics dealt with separately should be understood as forming essential ingredients of one system.

Summing up.

To sum up: Logic is that systematic body of knowledge which treats of those processes and products which regulate valid thinking, and lays down rules which must be observed in order that they may be valid. It is concerned not merely with formal truth but also with material truth because truth is essentially one.

Note 1. Formal and Material Logic.

The distinction between Formal and Material Truth has led logicians to recognise two broad divisions of Logic *viz.*, Formal and Material Logic.

Formal Logic deals with self-consistency only while

Formal Logic *aims merely at formal truth.* Formal Logic is concerned merely with the forms of thought *i.e.*, with the manner of our thinking irrespective of the particular objects about which we are thinking.

In Formal Logic, we do not question the truth of the premises—we take it for granted that the premises are true and only examine whether the conclusion correctly follows from the premises or not. Formal Logic is also known as *Pure Logic* or *Logic of Consistency*.

Material Logic deals also with consistency of thoughts with things.

Material Logic *aims not merely at formal truth but also at material truth.* Material Logic deals with the question whether the particular objects about which we are thinking actually correspond to the real things of the world. In Material Logic we are concerned with the question whether the premises are true as a matter of fact, and whether the conclusion which is drawn corresponds to the actual state of things. Material Logic is also called *Applied Logic*.

Two schools of logicians :

Formal and Material Logicians: There is a controversy among logicians as to whether Logic should at all concern itself with material truth. Formal Logicians *e.g.*, Hamilton, Mansel, Thomson maintain that Logic is concerned merely with the forms of thought, and not with its matter. According to **Hamilton, "Logic is the science of the Formal Laws of Thought".** Thus Formal Logicians hold "Logic is the science, not of Truth, but of Consistency." In this quotation, the word 'truth' is used in the sense of 'material truth' only, and the word 'consistency' is used in the sense of 'self-consistency' or 'formal truth' merely. Hence this quotation means that Logic is concerned with formal truth only, not with material truth. The same idea is expressed by saying that Logic deals only with the "explication" of thought, and not with its "amplification". 'Explication' means the act of unfolding which is the task of Formal

Logic, while 'amplification' means enlargement, which is the task of Material Logic.

Formal Logicians take too narrow a view of Logic

The correct view is that *Logic is concerned both with formal and material truth*, and therefore Logic is both Formal and Material. To identify Logic with Formal Logic only is to take too narrow a view of the scope of Logic, and is based on the wrong assumption that the forms of thought are completely separable from its matter. Formal and Material Logic are not to be construed as two water-tight compartments but only as two aspects of one science. For convenience of treatment, they are dealt with separately but truth being essentially one, the different topics dealt with separately should be understood as forming essential ingredients of one system.

Deductive and Formal Logic; and also Inductive and Material Logic are sometimes used as synonyms; sometimes again, Deductive and Inductive Logic are said to confine themselves with reasonings only (not with subsidiary processes)

Deductive and Inductive Logic: The question is sometimes asked—How is the distinction between Formal and Material Logic related to that between Deductive and Inductive Logic? Sometimes, Formal Logic and Deductive Logic, on the one hand, and Material Logic and Inductive Logic on the other hand, are used synonymously. It is more usual however to employ Deduction and Induction to mean the two main forms of reasoning, and in this sense, they are equivalent to formal and material reasonings respectively. But Logic is not concerned with reasonings only but also with certain subsidiary processes. Hence Formal Logic includes besides all deductive reasonings, certain subsidiary processes *e.g.*, forms of Terms and Propositions, conditions of Formal Definition and Division etc.; while Material Logic includes besides inductive reasonings, such subsidiary processes as material conditions of Definition and Classification, doctrine of Import of Propositions, Predicables etc.

Note 2. Scope of Logic.

The scope or province of a science means the subject-matter with which it deals—within which the science confines its investigations. A Science has a particular department of its own—and in *defining* a science, we determine its limits, *i.e.* to say, we determine the particular sphere or department of knowledge with which it concerns itself.

Logic has been defined as the science of the regulative principles of valid thought. Thus the department within which Logic carries on its enquiries is "*valid thinking.*" Valid thinking may therefore be said to constitute the scope or province of Logic.

The word "*Thought*" means both the processes and the products of thinking. The processes of thinking are Conception, Judgment and Reasoning, and the products of thinking are Concepts, Judgments and Reasonings. As the subject-matter of Logic includes *both the processes and the products of thinking*, the scope of Logic may be said to include all of them.

Validity or Truth may be formal or material, and Logic is concerned *both with Formal and with Material truth.* Formal Logic includes all forms of Deductive Reasonings and also other formal processes such as Rules of Formal Definition and Division, and forms in which propositions should be expressed in Logic. Material Logic includes all Inductive Reasonings as well as the doctrine of Predicables, Import of Propositions, and material conditions of Division, Classification and Nomenclature. Thus all these fall within the scope of Logic.

Sec. 11. Logic as a Science and an Art.

Is Logic a Science or an Art?

Much dispute has centred round the question whether Logic should be considered a Science only, an Art only, or both at the same time. The writers of the *Port Royal Logic*, **Aldrich** and others, call it an Art. **Mansel** and **Thomson** deny that Logic is an Art and call it a Science. **Whately** combined these two views and **Mill** agreed with him in recognising that Logic is both a Science and an Art.

Logic is both a science and an art—it has both a theoretical and a practical aspect.

The correct view seems to be that **Logic is both** **Science and an Art.** A Science deals with the laws nd principles governing a definite group of facts and n Art lays down rules for the attainment of a certain nd. A Science teaches us *to know* and an Art, *to do.* ogic is a Science in so far as *it teaches us the rinciples of valid thought,* and it is an Art because it *ays down rules for the attainment of truth and voidance of errors.* Thus Logic has a theoretical as ell as a practical side. By the very fact that Logic ays down principles of valid thinking, it furnishes ules for avoiding and detecting false and erroneous easonings. Hence Logic is also called a *practical cience,* i.e., a systematic study of the general principles f correct thinking with a view to applying them to ractice for the attainment of truth.

Logic is the Science of Sciences and the Art of Arts.

Logic has indeed been described as the Science of ciences (*scientia scientiarum*) and the Art of Arts *ars artium*). It has been called **the Science of ciences** because though the different sciences deal ith different departments of Nature, a knowledge of he general laws of valid thought with which Logic eals, is indispensable for all of them. Every science ust be *logical,* i.e., it must conform to the general aws of correct thinking dealt with in Logic. In short, here is something in which all sciences are similar and he work of Logic is to deal with the common basis of ll sciences. Similarly, Logic has been called the **rt of Arts** because, while the various arts lay own rules for the attainment of truth in their own articular spheres, they all follow the rules for he attainment of truth in general. Logic as the rt of right thinking underlies and directs all the ther arts.

Sec. 12. Various Definitions of Logic.

Aldrich.

I.—**Aldrich** defines Logic as **"the Art of Reasoning."**

Whately.

Whately amends it and defines Logic as **"the Art and Science of Reasoning."**

These definitions are too narrow and have been objected to on the following grounds :—

(*a*) Aldrich's definition that Logic is "the Art of Reasoning" fails to recognise that Logic is also a science. The definition of Whately is free from this defect. Both these definitions, however, recognise the practical aspect of Logic.

(*b*) Again, both these definitions are defective, in so far as according to them Logic is concerned only with Reasoning. It is true that Logic is mainly concerned with Reasoning, but there are certain other subjects not comprised under "Reasoning" and yet Logic treats of them, *viz.*, Division, Classification, Definition etc. There are definite rules which govern these subjects and the rules must be observed in order that they may be true. Thus, to say that Logic is confined to Reasoning only is to make the definition *too narrow.*

Thomson.

II.—**Thomson** defines Logic as **"the Science of the Laws of Thought."**

This definition is open to the following objections :—

(*a*) Logic is not merely a Science but also an Art. It has not only a theoretical side but a practical side as well. It not only teaches us in what valid thinking consists but also how to attain valid thinking. This definition completely neglects the *practical* side of Logic.

(*b*) The word "Thought" is somewhat ambiguous. In the wider sense, the word "Thought" is synonymous with "Knowledge" and includes Perception, Memory and Imagination as well as Abstract and General Thought. In Logic, the word "Thought" is used in a narrower sense to mean only *abstract and general thought.*

(*c*) Another serious criticism to which this definition can be subjected is that it seems to imply that Logic is concerned with thoughts as they are. Logic however, is not a ositive but a *normative science.* Logic does not deal with all kinds of thinking but only with valid thinking—with thoughts as they should be as distinguished from Psychology or the science of the human mind—which deals with thinking as it is.

III.—**Hamilton** defines Logic as **"the Science of the Formal Laws of thought."** Hamilton.

The definition has the following defects:—

(*a*) It confines itself exclusively to the theoretical side of Logic but Logic is not merely a Science but also an Art.

(*b*) The word "Thought" is ambiguous. Logic deals only with abstract and general thought but the word "thought" is sometimes used in a wider sense. [See II. (*b*)].

(*c*) Besides these defects which are also to be found in the definition given by Thomson, this definition is open to the serious objection that it limits the scope of Logic to "*formal truth*" only. But Logic is concerned not simply with formal laws of thought which aim at formal truth but also with those other laws which aim at material truth. This definition identifies Logic with Formal Logic only, leaving aside the consideration of Material Logic altogether.

IV.—**Arnauld** defines Logic as **"the science of the understanding in the pursuit of Truth."** Arnauld.

This definition has the following defects:—

(*a*) It ignores the practical side of Logic and only ecognises its theoretical character.

(*b*) The word "Truth" is ambiguous. It should be learly stated that Logic aims both at formal truth and at aterial truth.

(*c*) The more serious objection, however, to which this efinition is open is that Logic is concerned with some processes other than the operations of the understanding, *e.g.*, the ubsidiary processes of Definition, Division, Classification, etc.

V.—**Mill** defines Logic as follows:— Mill.

"Logic is the science of the operations of the nderstanding which are subservient to the estimaon of evidence; both the process itself of

advancing from known truths to unknown and all other intellectual operations in so far as auxiliary to this."

This definition may be analysed in the following way:—

(*i*) Logic is not only a science but it is also concerned with the *estimation of evidence.* The expression "estimation of evidence" implies that Logic has to examine the premises from which the conclusion is drawn in order to determine its truth. Hence this definition recognises both the theoretical and practical aspects of Logic.

(*ii*) The scope of Logic is not limited merely to the "operations of the understanding subservient to the estimation of evidence." It also includes "all other intellectual operations in so far as auxiliary to this." Thus Logic includes the operations of Naming, Definition, Classification, etc.

Sec. 13. Utility of Logic.

Objections to the study of Logic:

Objections to the study of Logic: The utility of Logic has sometimes been disputed. The study of Logic, it has been said, is useless inasmuch as *firstly*, Logic does not teach us to reason, and *secondly*, Logic does not even teach us to reason correctly.

(*i*) Logic does not teach us to reason.:

(*i*) To the objection that Logic does not teach us to reason, the answer is that Logic never aspires to do so. It is not the function of Logic to teach us to reason. We learn to reason or to think just as we learn to walk or to talk by the use of our natural powers. Logic does not teach us to reason, but only to reason correctly, just as in the army a new recruit is taught not to walk but to march *i.e.* to walk correctly according to measured steps. The function of the science of Logic is to teach us to avoid mistakes in our own reasonings, and to detect errors in the reasonings and thoughts of other people.

(*ii*) Critics have pointed out that Logic has not proved much of a success even in its avowed object of teaching us to reason correctly. Do not people who have never studied Logic reason correctly? Again, do not those who have studied Logic fall into error? This objection appears at first sight to be formidable but it is really based on a misconception as to the function and nature of scientific knowledge, as distinguished from popular knowledge. Logic is the science of reasoning; now scientific reasonings and popular reasonings are not different in kind; the difference is that scientific reasonings are more systematic and more exact than popular reasonings. Hence popular reasonings need not be necessarily fallacious. Logic deals with the principles of correct reasoning. The ordinary man, perhaps unconsciously, follows these very principles. Logic merely makes the application of these principles conscious and systematic. To say that men can reason well without any knowledge of Logic is about as true as to say that men can live healthily without any knowledge of the science of medicine. This is certainly true, but this only means, men can live healthily so long as they are healthy, but as soon as they fall ill, they have to avail hemselves of the services of a man possessing medical knowledge. Similarly, so long as men do reason orrectly, by the natural exercise of the powers of mind, they need not take the help of Logic, but as oon as they fall into error and confusion, a knowledge f Logic is indispensable *to detect the cause of the rror* and to find out how correct reasoning can be tained.

(*ii*) not even to reason correctly.

Only a study of Logic can ensure correct reasoning.

Uses:

The **Uses of Logic** may be summarised as follows:

Logic furnishes principles of correct thinking

(a) *Logic furnishes scientific knowledge of the principles of correct thinking, by the observance of which truth is attained, errors detected, and avoided.* No doubt an intelligent man without any special study of Logic— by the exercise of what is called "sound common-sense"— may be able to reason correctly, and say that particular arguments are erroneous, but only a study of Logic can help us in explaining precisely why an erroneous argument is faulty, and in giving the fallacy a name.

Science of sciences

(b) *Logic is the science of sciences.* The different sciences deal with different departments of the world and Logic has no concern with the special subject-matter of these sciences. But Logic deals with the general laws of thought which must be observed in every science in order that knowledge in its own sphere may be true. Every science must conform to the general laws of correct thinking with which Logic is concerned.

Mental gymnastic.

(c) The chief value of Logic is that *it is pre-eminently an intellectual discipline or a mental gymnastic.* The study of Logic cultivates the power of abstract thought and trains and develops the reasoning powers. Man is distinguished above the lower animal creation by the possession of a conscious intellect—of a power of reasoning by concepts or general ideas, and the study of Logic which affords a training of such reasoning powers cannot but possess great importance. A man who, by a study of Logic, has trained his mind to reason correctly, will reap the advantage in every department of study to which he may devote himself.

Sec. 14. Logic and Psychology.

Psychology is the Science of Knowing, Feeling and Will.

Psychology (*Psyche*—mind; *logos*—reasoned account or Science) literally means *a reasoned account or science of mind.*

The mind has three main functions *viz.*, Knowing, Feeling, and Will. To take an example: Suppose a student who sat for an examination finds his name in the list of successful candidates—he *knows* he has passed; then his mind is full of joy or what means the same thing, he *feels* joy; and then he forms a resolution in his mind to prosecute his studies further and to proceed to the next higher examination—to use the language of Psychology, he *wills* that he would study further. Thus *Knowing, Feeling* and *Will* are the three functions of mind and constitute the subject-matter of Psychology.

Psychology deals with all kinds of knowledge while Logic deals only with general and abstract knowledge.

Knowledge may be either mediate or immediate knowledge. We may have knowledge of the individual and the concrete or of the general and the abstract. Logic is concerned with general and abstract knowledge which is equivalent to "Thought" in the narrower sense of the word. Thus while Psychology deals with all kinds of knowledge, immediate and mediate, individual and general, concrete and abstract, Logic deals only with mediate, general and abstract knowledge. Looked at from this point of view, the scope of Logic is narrower than that of Psychology, because *Psychology deals with all kinds of knowledge, whereas Logic deals only with mediate, general and abstract knowledge.*

Psychology deals with Knowing Feeling and Will while Logic deals only with Knowledge.

In another sense, again, Logic is narrower than Psychology. Psychology deals not only with Knowledge but also with Feeling and Will. We not only have knowledge of things but have feelings of pleasure and pain, joy and sorrow etc. Besides, we have in our minds certain states which outwardly manifest hemselves in the form of actions. These states are collectively described as Willing. The most advanced state of mind which omes under this head is what may popularly be described as orming a resolution. We resolve to do something and this esolution in the mind manifests itself in certain actions. Thus *while Psychology is interested in Feeling and Will in ddition to Knowledge Logic is not at all interested in Feeling r Will but only with Knowledge.* Thus the scope of Logic is much narrower than that of Psychology.

Psychology is a positive science while Logic is a normative science.

There is another important distinction between Logic and Psychology. *Psychology is a positive science while Logic is a normative science.* A positive science deals with things as they are while a normative science deals with things as they should be. Psychology is a positive science, because it deals with thinking as it actually is—it deals with the question as to how we actually *do* think. It is thus interested in all kinds of thinking—correct as well as incorrect. Logic on the other hand is a normative science because Logic deals with thinking as it should be—it deals with the question as to how we *should* think. Logic thus puts before itself a norm or ideal, *viz.*, the ideal of corectness or truth, and enquires into the conditions which must be observed in order that our thoughts may conform to the ideal of truth, *i.e.*, in order that our thoughts may be valid.

Study of Psychology is helpful to Logic.

It may be pointed out, however, that though the provinces of Logic and Psychology are distinct, a knowledge of Psychology is extremely valuable in studying Logic. It is clear that in order to investigate into the question as to how we *should think*, a knowledge of how we *actually think* would be of great value.

Summing up :

To sum up: (*i*) Psychology deals with knowing, feeling and will while Logic deals with knowledge only.

(*ii*) Knowledge again may be immediate or mediate, concrete or abstract, individual or general. While Psychology deals with all these kinds of knowledge, Logic deals with mediate, abstract and general knowledge. Thus the scope of Logic is much narrower than Psychology.

(*iii*) Logic is a normative science while Psychology is a positive science.

Note. Logical and Psychological treatment of thought.

Both Logic and Psychology are said to be concerned with 'Thought'. Here the word 'Thought' is used ambiguously. In one sense 'Thought' means a certain kind of concrete mental state. Thus when we see a certain colour, we have a mental state called sensation ; when we see an object present before us, we have a mental state called percept ; when we think of an object which we saw before but which we do not see at this particular moment, we have a mental state called image. Psychology deals with sensations, percepts, images and such other mental states. Thus Psychology is concerned with thought in the sense of concrete mental states of individuals. Logic however is concerned with thought in a different sense *viz.*, in the sense of abstract relations and properties belonging to actual or potential grounds of belief. To take a simple illustration : the given proposition "All men are mortal" is true ; if it be true, what about the proposition "Some men are mortal"? Logic points out that the truth of the latter proposition is involved in that of the former, that the relationship between these two propositions is such that the truth of the latter follows from the truth of the former.

It should be noted here that Logic is concerned not so much with thought as with the *validity* of thought. Logic investigates into the conditions which must be fulfilled in order that thoughts may be valid and errors may be avoided.

Sec. 15. Logic and Metaphysics.

Metaphysics is that branch of knowledge which deals with ultimate Reality—with Reality as it is in itself as distinguished from Reality as it appears to us.

Metaphysics should be distinguished from Science. A Science deals with a particular department of Nature or Reality. The Reality with which a science deals is not Reality s it is in itself but as it appears to us. A science deals with henomena or appearances and not with what lies beyond hese appearances, *i.e.*, the ultimate Reality. The ultimate Reality is called the Noumenon (or the thing-in-itself), and it s with the Noumenon that Metaphysics deals.

Metaphysics deals with Reality as it is in itself while Science deals with appearances.

Every science makes certain presuppositions or assumptions hich it takes for granted without proof. These assumptions rm the foundations of the science in question. For example, hemistry is the science of material objects. Chemistry takes r granted the existence of Matter and on the basis of this sumption, it carries on its investigations within its own rticular department. Other sciences are similarly based on rtain assumptions which are taken to be true without question.

Metaphysics deals with presuppositions of all Sciences.

Now Metaphysics which deals with the ultimate nature of Reality enquires into the nature of these assumptions of the various sciences. The various sciences make these assumptions, and Metaphysics enquires into the truth of these assumptions. The science of Chemistry assumes the existence of Matter while Metaphysics enquires into the question as to whether this assumption is true, as to whether Matter *really* exists. Psychology as a science assumes the existence of Mind while Metaphysics enquires whether this assumption is correct—whether Mind *really* exists. Thus Metaphysics deals with the presuppositions or foundations of the various sciences and enquires into their truth.

and therefore also of Logic.

Logic is a science. It has for its department—"valid thought." Logic deals with the principles which regulate valid thinking—which must be observed in order that our thoughts may be correct and which, if violated, would lead to error and confusion. As a science, Logic makes certain presuppositions or assumptions ; for example : The Laws of Identity, Contradiction, Excluded Middle, Sufficient Reason, the Law of Uniformity of Nature, etc. Logic is the science of proof but it accepts these fundamental principles without proof. Metaphysics would deal with the question as to whether these presuppositions, on which the whole science of Logic rests, are ultimately true. Looked at from this standpoint, the relation of Metaphysics to Logic stands on the same footing as the relation of Metaphysics to other sciences.

From another point of view, however, Logic is helpful to Metaphysics in the same way as it is helpful to the various sciences. Logic is the science of valid thinking. Now, Metaphysics like the special sciences involves thinking and reasoning which must be valid. Metaphysical reasonings must be *logical*, *i.e.*, must conform to the general principles of correct thinking as laid down in Logic.

To sum up : Metaphysics deals with the ultimate presuppositions which form the foundations of the science of Logic, but Logic, being the science of correct thinking, holds its sway even in the sphere of Metaphysics, in so far as the reasonings of Metaphysics must be correct, *i.e.*, must conform to logical principles.

Exercise I.

1. Determine the character of Knowledge indicating its different forms and sources. Does all knowledge come within the province of Logic?

2. What is Knowledge? State, explain and illustrate its different forms. With which of these forms is Logic concerned, and why?

3. The sources of knowledge are said to be Perception, Inference and Authority; explain clearly the nature of each showing the difference between them by means of examples.

4. Distinguish between Immediate and Mediate Knowledge. Which of them constitutes the proper subject-matter of Logic?

5. From what sources does thought obtain materials for its reasonings? Has Logic anything to do with Immediate Knowledge?

6. When you go out in the morning and find the roads in a muddy condition, you believe at once that there had been rain during the night. Explain what is immediate and what is mediate in your knowledge of the subject, giving your reasons.

7. Distinguish between Mediate and Immediate Truth.

8. Distinguish between (*a*) the *form* and *matter* of thought; and (*b*) between *formal* and *material* validity of thought, and explain what is meant by saying that 'Logic is the science of the Formal Laws of Thought'.

9. Distinguish between the Form and Matter of Reasoning, and between Formal and Material Logic.

10. Distinguish between Formal and Material Truth. Which of them constitutes the proper subject-matter of Logic?

11. What do you understand by Truth? Distinguish between Formal and Material Truth.

12. Discuss the proposition that Logic is the science, not of Truth, but of Consistency.

13. Fully discuss the question whether Logic deals only with the consistency of thought or with truth of thought as well, with explication only or with its amplification as well.

14. Distinguish between Formal and Material Logic and ndicate their uses in the practical affairs of life.

15. Explain and illustrate the distinction between (*a*) Formal Logic and Material Logic; (*b*) Deductive Logic and nductive Logic. State precisely the connection, if any, between hem.

16. What do you understand by saying that 'Logic is oncerned with the 'forms of thinking'?

17. Explain the nature of the Logical Concept. Explain ow concepts are formed, and by what means they are retained n the mind and communicated to other minds.

18. Distinguish between Realism, Conceptualism and Nominalism, and explain their bearing on the logical process.

19. Explain what is meant by Thought and the relation of Thought to Language.

20. What is Science? What is Art? Illustrate your meaning by examples. Do you consider Logic to be a Science, or an Art, or both? State your reason fully.

21. Distinguish between a Science and an Art and explain why Logic has been called the Science of Sciences and the Art of Arts?

22. Is Logic a Science or an Art? Explain and illustrate the distinction between Science and Art.

23. How far is Logic a normative science?

24. Logic has been defined as the "science of the formal laws of thought"; explain what is here meant by 'Thought' and 'Formal Laws of Thought'. Do you consider this definition adequate? If not, substitute what you consider to be a better one, giving your reasons.

25. "Logic is the science of Thought"
"Logic is the art of Reasoning"

Explain and examine the above definitions and bring out from explanation and criticism the definition of Logic which appears to you to be satisfactory.

26. "Logic is the science of the operations of the understanding that are subservient to the estimation of evidence." Explain the definition.

27. When Logic is defined as the "science of the laws of thought", what is meant by the words 'science', 'law' and 'thought'?

28. Can you say that the study of Logic is useful when persons who have never studied it reason accurately? Give reasons for your answer.

29. Determine the scope of Logic and indicate the uses of its study. Does it render a man free from error?

30. "People can reason without Logic". Is this a sufficient objection to the study of Logic?

31. "The study of Logic cannot be useless". Point out the uses of the study of Logic.

32. What benefits does one expect to derive from the study of Logic?

33. Explain the relations of Logic to Metaphysics and Psychology.

34. Define Logic and point out its relation to the sciences in general and to Psychology in particular.

35. Distinguish between the logical and psychological treatment of thought.

CHAPTER II.

THE FUNDAMENTAL PRINCIPLES OF DEDUCTIVE LOGIC.

SEC. 1. Nature of the Fundamental Principles.
SEC. 2.—The Fundamental Principles or the Laws of Thought.
    I. The Law of Identity.
    II. The Law of Contradiction.
    III. The Law of Excluded Middle.
        NOTE: Mutual relation of the three Laws of Thought.
    IV. The Law of Sufficient Reason.
        NOTE: Hamilton's Postulate.
        Exercise II.

Sec. 1. Nature of the Fundamental Principles.

A *principle* or law is the statement of a general
ruth, *i.e.*, a truth which holds good universally, as
listinguished from a particular truth which holds good
n some cases only. A principle is called *fundamental*,
vhen it does not require any proof nor is capable of
ny proof. But though the fundamental principles
annot themselves be the subject-matter of proof, yet
hey form the very foundations of all proof. Every
ranch of knowledge is based on certain fundamental
rinciples. Now, Logic is concerned with correct think-
ng. Hence, **the fundamental principles of Logic
re those truths which Logic takes for granted
vithout proof but to which all our thoughts must
onform in order that they may be valid.** They
re those primary truths which form the foundations
f all correct thinking and the violation of which
vould render thought impossible.

Fundamental principles form the foundations of all proof but they themselves cannot be proved.

They are also called axioms or postulates.

These laws have been differently named by different logicians. **Ueberweg** calls them **the Axioms of Inference,** while **Mill** calls them—**the Universal Postulates of all reasonings.** These names imply that Logic assumes the truth of these principles and does not seek to prove them. Logic is the science of proof—it proves everything else with the help of these fundamental principles but cannot prove the fundamental principles themselves. Just as the human eye sees everything else but does not see itself (the reflection of the eye in the mirror is not the eye itself), so the fundamental principles of Logic prove everything else but do not prove themselves. They are the foundations of all proof but are themselves beyond the scope of proof. Their truth is taken for granted.

Sec. 2. The Fundamental Principles or the Laws of Thought.

There is some difference amongst logicians as to the number and expression of the fundamental principles of Logic. **Aristotle** formulated *three* laws, *viz.*, the Laws of Identity, Contradiction and Excluded Middle. In modern times, **Leibnitz** added a *fourth* law, *viz.*, the Law of Sufficient Reason.

I. THE LAW OF IDENTITY.

'A is A'.

The simplest statement of *the Law of Identity* is the formula, **"A is A"** or **"Everything is what it is."** It has also been expressed in the following ways:

Whatever is, is;
Everything is equal to itself;

A thing is what it is;
Everything is identical with itself;
Everything is its own nature;
Truth must be ever in conformity with itself.

At first sight, the law, *A is A*, appears to be a are tautology but *its true meaning is that a thing must emain the same throughout our discussion or thinking bout it.* To use the words of **Dr. P. K. Ray,** the law neans that "The data with which we start in Deducive Logic must remain unaltered." In course of any rgument we must use each term in one unvaried neaning. The element of time or change has no place n Deductive Logic which is thus distinguished from he course of Nature. Nature is constantly changing ike a flowing river and assumes different aspects at uccessive moments of time. Heraclitus (about 500 B.C.), an ancient Greek philosopher, says that we canot descend into the same stream twice. When we ppear to take a plunge into the river for the second ime the waters have flowed on and hence it is not the ame river. Deductive Logic, however, takes no notice f such changes. If we start with the idea that a ertain object possesses a certain attribute, we must lways admit that; if we use a term in a certain neaning, we must always use it in that meaning.

The data in Deductive Logic must remain unaltered.

II. THE LAW OF CONTRADICTION.

The Law of Contradiction may be stated in the ollowing ways:—

A cannot be both B and not-B;

Nothing can both be and not be at one and the ame time.

A cannot be both B and not-B.

A thing cannot possess contradictory attributes.

This law means that nothing can have at the same time and at the same place contradictory qualities—that two contradictory terms cannot both be true, at the same time, of one and the same individual thing; B and not-B, two contradictory qualities, cannot be both true of one thing, *viz.*, A. If A possesses the quality B, it cannot possess the contradictory quality not-B, at the same time. A piece of paper cannot be both white and not-white at the same time. If it be white, it cannot be also not-white, and *vice versa.* It is true that a paper may be not-white (*e.g.*, black) in one part, while it is white in other parts, or it may be white at one time and afterwards become not-white (*e.g.*, black) but we cannot conceive that it should be both white and not-white, at the same place and at the same time.

The Law of Contradiction has been called by **Hamilton, the Law of Non-Contradiction,** because non-contradiction or absence of contradiction is a condition of the correctness of thought.

✓ III. THE LAW OF EXCLUDED MIDDLE.

The Law of Excluded Middle may be stated thus:—

A is either B or not-B.

A is either B or not-B:

Everything must either be or not be.

A thing must possess one of the two contradictory attributes.

This law means that two contradictory terms cannot both be false, at the same time, of the same individual thing. B and not-B, two contradictory qualities, cannot both be false, of one and the same thing, *viz.*, A. If B be not true of A, not-B must be true of it and *vice versa.* If a piece of paper be not white, it must be not-white. As **Jevons** puts it: "The very name f the law expresses the fact that there is no third or iddle course; the answer must be Yes or No."

Laws of Contradiction and Excluded Middle compared.

According to *the Law of Contradiction*, two contradic-ory terms cannot both be true of one thing, *i.e.*, *one must e false*, e.g., the two contradictory terms, 'hard' and 'not-ard,' cannot both be true of the same thing, *viz.*, 'this rock.' This rock is hard" and "This rock is not-hard" cannot both e true—one must be false. If the former be true, he latter is false and *vice versa*. According to *the Law of xcluded Middle*, two contradictory terms cannot both be alse of the same thing, *i.e.*, *one must be true*. If the erm 'hard' be not true of 'this rock,' its contradictory ot-hard' must be true of it and *vice versa*. Thus accord-ng to these two principles taken together, the truth of one ontradictory proposition implies the falsity of the other and he falsity of one implies the truth of the other. Both can-ot be true and both cannot be false; one of them must be rue and the other must be false.

Note.—According to **Ueberweg,** the Laws of Contradic-ion and Excluded Middle may be comprehended in a general rinciple, *viz.*, **the Principle of Contradictory Disjunc-ion.** The formula of this is—**As is either B or is not-B.** his means that

(*a*) A cannot be both B and not-B (Law of Contradiction); and

(*b*) A is either B or not-B (Law of Excluded Middle).

The following points should be noted in connection ith these two Laws:—

(1) The principles refer to contradictory terms.

(1) These two Laws refer to *contradictory* nd not to contrary terms. Contrary terms cannot both e true, though they may both be false, of the same ning: for example, the contrary terms 'white' and lack' cannot both be true of a particular piece of aper but may both be false; for this paper may be d, *i.e.*, neither black nor white. Similarly, 'This ock' may be neither hard nor soft but half-way etween, a little hard and a little soft. But two con-

tradictory terms, *e.g.*, 'white' and 'not-white' cannot be both true or both false, but one of them must be true and the other must be false.

(2) 'A' refers to an individual object.

(2) The Law of Contradiction states—A cannot be both B and not-B; The Law of Excluded Middle states—A is either B or not-B. In the illustrations given, 'A' signifies an *individual thing* and not a class of things. If 'A' signifies a class of things, two contradictory attributes may both be true or false of it. For example, it is quite correct to say 'Man is both civilised and non-civilised' or 'Man is neither civilised nor non-civilised' because the term 'Man' denotes a class and not an individual. But we cannot say, 'Alexander the Great is both civilised and non-civilised' or 'Alexander the Great is neither civilised nor non-civilised.'

Note. Mutual relation of the three Laws of Thought:

The question has sometimes been asked whether the three laws—*Identity, Contradiction* and *Excluded Middle* are equally fundamental or there is one master Law which implicitly involves all of them. Thus it has been said that the Law of Identity involves the Law of Contradiction because the latter is merely a negative way of expressing the same fact asserted by the former. It may be said however that affirmation and negation. are fundamentally different and stand for distinctions which should be maintained. No doubt affirmation fully understood involves the denial of its contradictory, and conversely, but it is also true that they deal two different aspects of thought. Similarly it may be shown that the Law of Excluded Middle on the one hand and the Laws of Identity and Contradiction on the other, though mutually inter-related, are distinct principles emphasising fundamentally irreducible aspects of thought.

IV. THE LAW OF SUFFICIENT REASON (LEIBNITZ.)

The *principle of Sufficient Reason* may be stated the following words:—**"Nothing happens with- ut a reason why it should be so rather than therwise."**

This law means that if there be a change in the xisting state of things, there must be sufficient reason hy this change should occur. To take a classical xample: Newton saw an apple fall and asked him- lf—Why does the apple fall? Surely, there must some satisfactory explanation—which he found to nsist in the Law of Gravitation.

There must be sufficient reason for changes.

This principle is thus the inevitable supplement the principle of Identity. According to the latter, e data must remain unaltered but this law adds—if ere be any change, there must be some antecedent rcumstance capable of producing it.

ote:—Hamilton's Postulate.

Besides the Fundamental Principles noted above, ere are certain subordinate Axioms and Postulates which we may briefly notice what is known as *milton's Postulate.*

Hamilton states his *postulate of Logic* in the llowing words:—

"Logic postulates to be allowed to state ex- citly in language all that is implicitly contained the thought."

Logic is concerned only with thoughts as expressed language. Now, the same thought may be express- in different language. This law states that we can ly change the *form* of expression, provided the

The form of expression may be changed provided the meaning remains the same.

meaning remains the same. It is the meaning of words and not their form that is important. Hence, so long as the meaning is unchanged, the mode of stating a proposition may be changed. For example, the thought expressed in the proposition—"All men are mortal" may also be expressed by saying, "No men are immortal."

This law may be deduced from the Law of Identity. The thought expressed in one form is *identical with* the thought expressed in another form and since everything is identical with itself, one form of expression may be substituted for another.

Exercise II.

1. State and illustrate the Principle of Identity. Give its precise significance. Why is it called a principle of formal reasoning?

2. Enunciate the Principle of Identity and state its significance.

3. Examine the question whether the Principle of Identity is a mere tautology.

4. State and illustrate fully the Principles of Identity and Contradiction, exhibiting their relation to each other. Explain and illustrate their use or significance as principles of reasoning.

5. State and explain the Laws of Identity and Contradiction and point out their use as principles of reasoning.

6. State the Principles of Identity, Contradiction and Excluded Middle; and explain their practical application in Deductive Logic.

7. State and explain the principles of Identity. Contradiction and Excluded Middle as Fundamental Laws of Thought. Are they equally Fundamental? Discuss the question fully.

8. State and explain with concrete illustrations the Fundamental Principles of Deductive Logic.

9. What do you understand by the Fundamental Principles of Logic? Illustrate your answer by examples.

10. What do you understand by the Principle of Sufficient Reason? Indicate its importance in Logic.

CHAPTER III.

TERMS.

SEC. 1. Words and Terms : Categorematic and Syncategorematic Words.
NOTE. Does the Chapter on Terms form a part of Logic ?
SEC. 2. Denotation and Connotation of terms.
SEC. 3. Various divisions of terms and their significance :
A. Simple and Composite.
B. Singular and General.
C. Collective or not ; Collective and Distributive uses of terms.
D. Concrete and Abstract.
E. Positive, Negative and Privative.
NOTE. Opposition in terms—Contradictory and Contrary Terms.
F. Absolute and Relative.
G. Connotative and Non-Connotative.
Exercise III.

Sec. 1. Words and Terms : Categorematic and Syncategorematic Words.

'Word.' We all know what is meant by a *Word*. A Word consists of a letter or combination of letters conveying some meaning. A word may consist of only one letter, *e.g.*, a, I ; or it may consist of more than one letter, *e.g.*, an, man, horse, mortal, mmediately etc.

'Sentence.' Now what is known as a *Sentence* in Grammar s made up of words ; *e.g*, I am, Man is mortal, The horse is a quadruped animal etc. A sentence, thus, s a combination of words, containing a complete thought.

Proposition. Roughly speaking, a Sentence in Grammar orresponds to what is known as a *Proposition* in Logic. A Logical proposition is not the same as a grammatical sentence but only roughly corresponds to it. A logical proposition consists of three parts, *viz.*, the subject, the predicate and the copula. The *Subject* is that of which something is affirmed or denied; the *Predicate* is that which is affirmed or denied of the subject; and the *Copula* is the sign of relation between the subject and the predicate. For example: in the sentence or proposition "Man is mortal," "Man" is the subject, "Mortal" is the predicate and "Is", the Copula.

Term.

A Term is a word or a combination of words, which by itself is capable of being used as subject or predicate of a logical proposition.* A term (from Lat. *Terminus* or boundary) is so-called, because it occurs at the boundaries of a logical proposition. In the proposition 'Man is mortal', the words "Man" and "Mortal" occur at the boundaries of the proposition and are terms, because they are capable of being used as the subject or the predicate of a proposition. The word "Is" is not a term because it is not so capable.

All terms are words but all words are not terms.

We find, therefore, that *every word is not a term, though every term is a word or a combination of words.* Words or combinations of words become terms only when they are capable of being used either as the subject or as the predicate of a proposition. All words are not so capable and thus are not terms.

Hence in Logic, Words have been divided into two classes, *viz.*, *Categorematic and Syncategorematic.*

---

* Some Logicians maintain that a term is a word or a combination of words which is *actually used as subject or predicate* of a proposition. In this sense a word or a combination of words capable of being so used though not actually used may be called a *possible* term.

A Categorematic word is one which can be used s a term by itself, without the support of other vords; while a Syncategorematic word is one vhich cannot be used as a term by itself but can nly form a term when joined to one or more Cate-orematic words. Thus, *Categorematic words are rms while Syncategorematic words are not terms.* or example, the word "man" is a Categorematic word r Term, because it can be the subject or the predicate f a logical proposition. Similarly the word "He" is a ategorematic word because it can be the subject of proposition; the word "white" is Categorematic ecause it can be the predicate of a proposition; and on. As examples of Syncategorematic Words, we ay take such words as "of" "the" "and" etc., words hich can never be Terms by themselves.

Categorematic words are Terms.

037548

Now let us compare this division of Words in Logic with e division of Words as recognised in Grammar. In Grammar divide Words into different classes called *Parts of Speech* ch as Nouns, Pronouns, Articles, Adjectives, Participles, rbs, Adverbs, Prepositions, and Conjunctions. In Logic, wever, we divide Words into two classes only, *viz.*, Cate-rematic Words (or Terms) and Syncategorematic Words (or n-Terms). A Word i[illegible]Logic is either a Term or not.

Division of Words in Grammar compared with the division of Words in Logic.

Let us consider how the various Parts of Speech, ognised in Grammar, fit in with the logical classification of rds into Categorematic and Syncategorematic. Of the dif-ent parts of speech mentioned in the preceding paragraph, *uns* (including those words which have the force of Nouns are called *Substantives*), *Pronouns* (excepting Relative Pro-ns), *Adjectives*, and *Participles* are Categorematic rds or Terms; while *Articles*, *Prepositions*, *Conjunctions*, *erbs*, *Relative Pronouns*, (such as Who, Which, etc.) in r ordinary use, are Syncategorematic words, because they not capable of being used by themselves as Terms. In ositions such as 'The' is an article, 'On' is a preposition, ' is a conjunction, 'Only' is an adverb, the words 'The'

'On' 'But' and 'Only' are used as subjects of propositions and must therefore be considered as Categorematic. But it is clear that these words have been used as substantives and not as articles, prepositions, conjunctions or adverbs as such. Thus 'The' here means 'the word The,' 'On' means 'the word On,' and so on. As for *Verbs*, in Logic they are changed to Participles united with the verb "to be." The verb 'to be' is the only verb recognised in Logic, and is Syncategorematic, because it can neither be the subject nor the predicate of a proposition. It can only form the copula.

'Acategorematic.'

Some Logicians recognise another class of words, *viz.*, Acategorematic. By an **Acategorematic Word,** they understand a word which can never be used as a Term either singly or even when joined with other words, such as, *Interjections.* Syncategorematic words become Terms when joined with Categorematic words but Acategorematic words can never be used as Terms because they cannot be joined with other words. In this connection it may be pointed out that Interjections are merely exclamatory sounds and we cannot speak of joining them with other words. Some writers on Grammar hesitate to call Interjections parts of speech.

Note. Does the Chapter on Terms form a part of Logic?

Place of Terms in Logic.

The question is sometimes raised as to whether the Chapter on Terms properly forms a part of Logic. The answer is clearly in the affirmative. It is true that Logic is primarily concerned with Reasoning but Reasonings when expressed in language necessarily involve Propositions, which in their turn have as their essential ingredients, Terms. Hence in dealing with Reasonings, Logic necessarily deals with Propositions and Terms. In fact, treatment of Reasoning really begins with the consideration of its elements, Terms and Propositions.

ec. 2. Denotation (or Extension) and Connotation (or Intension) of Terms.

Most terms have at the same time *two meanings*, f which, one is called their Denotation and the ther, their Connotation. **The Denotation (or xtension) of a term consists of the individual hings to each of which the term is applicable in he same sense, while the Connotation of a term onsists of the essential attributes possessed in common by each of the individual things denoted by it.** 'hus *a term denotes things and connotes attributes.* 'or example: The term 'Man' denotes "all men" and onnotes the common and essential attributes, *viz.*, nimality' and 'rationality' possessed by all men. imilarly, the term 'Triangle' denotes "all triangles" hile it connotes the essential attribute possessed in ommon by all triangles, *viz.*, the attribute of being a lane figure bounded by three straight lines.

A term denotes things and connotes attributes.

N.B.—Synonyms for Denotation or Extension are **Extent, readth, Scope, Domain** etc., while those for Connotation or tension are **Intent, Depth, Comprehension etc.**

Now, what is the relation between the denotation nd the connotation of a term? It has been id that **the denotation and the connotation of a rm vary inversely.** By this is meant, if one creases, the other decreases and *vice versa*. Thus:

Denotation and Connotation vary inversely.

(1) If denotation increases, connotation decreases ;
(2) If denotation decreases, connotation increases ;
(3) If connotation increases, denotation decreases ; and
(4) If connotation decreases, denotation increases.

For example: The term 'man' has for its denotation l men" and for its connotation the common and essential ributes 'animality' and 'rationality.'

Examples:

Now, if we increase the denotation of the term 'man' by the addition of 'all other animals' (denotation of 'man'+all other animals=all animals), the connotation will consist of the attribute 'animality' only (connotation of 'man'—rationality= animality). Thus *increase in denotation is followed by decrease in connotation.*

Again, if we decrease the denotation of the term 'man' by excluding 'uncivilized men' (denotation of 'man'—'uncivilized' men=civilized men), the connotation will increase by the addition of the attribute 'civilized' (Connotation of 'man'+the attribute 'civilized'=connotation of 'civilized man'). Thus *decrease in denotation leads to increase in connotation.*

Then again, if we increase the connotation of the term 'man' by the addition of the attribute 'honesty,' (connotation of 'man'+'honesty'=animality+rationality+honesty), the denotation will decrease and consist of only 'Honest men' and not all men (denotation of "man'—'non-honest men'=honest men). Hence, *if connotation increases, denotation decreases.*

Lastly, if we decrease the connotation of the term 'man' by excluding the attribute 'rationality,' (connotation of 'man'— rationality=animality), then, the denotation will increase because the remaining attribute 'animality' will be possessed not only by all men but by all animals (denotation of 'man'+all other animals=all animals). Thus *if connotation decreases, denotation increases.*

Related Series.

This relation of inverse variation between the denotation and the connotation of terms is best illustrated by taking *a related series of terms.* For example, let us take the following series:—

Figure, Plane figure, Rectilinear plane figure, Quadrilateral, Parallelogram, Rectangle and Square.

In this series the first term 'Figure' has the widest denotation but the least connotation; and as we examine the succeeding terms, we find that while denotation is decreasing, connotation is increasing till we reach the last term in the series, *viz.*, 'Square,' which has the least denotation but the greatest amount of connotation. Thus this series illustrates the decrease of denotation being followed by the increase of connotation. The opposite process of increase of denotation being followed by decrease of connotation may be illustrated by the following series:—

Man, Animal, Living Thing, Material Thing, Thing.

Genus and Species.

Genus and Species: When two terms representing classes are so related to each other that the denotation of one of them includes the denotation of the other, the term of wider denotation is called a *Genus* in relation to the term of narrower denotation, which is called a *Species*. For example, the term 'animal' is a genus in relation to the term 'Man;' and the term 'man' is a species in relation to the term 'animal.' It is quite clear that this also illustrates the relation of inverse variation between denotation and connotation of terms. While the denotation of the genus 'animal' is greater than the denotation of the species 'man,' the connotation of the genus, *viz.*, animality is less than the connotation of the species, *viz.*, animality and rationality. (See Ch. IV).

For a proper appreciation of the relation of inverse variation between the denotation and the connotation of terms, the following points should be clearly understood:—

Increase or Decrease in Denotation or Connotation leads to the formation of a new term.

(*a*) Firstly, it should be clearly understood that when we increase or decrease the denotation or the onnotation of a term, it no longer remains the same erm but becomes *another term*. For example, if we ncrease the connotation of the term 'man' by adding o it the attribute 'honesty', it becomes another term, *iz.*, 'honest man,' and it is the denotation of the new erm which is less than that of the old. Similarly, if ve decrease the connotation of the term 'man' by emoving the attribute 'rationality,' it becomes a new term, *viz.*, 'animal', and it is the denotation of the new term which becomes greater than that of the old.

From this it follows that if we add to the connotation of a term an attribute which is *possessed by all the members* denoted by the term or which *follows from any part of the connotation,* it remains the same term and as such its denotation is not decreased. For example, the term 'triangle' connotes the 'attribute of being a plane figure bounded by three straight lines.' Now if we add the 'attribute of possessing three angles' to the connotation of the term, there is no corresponding decrease in denotation, because the attribute which is added is possessed by all triangles and may be said to follow from the connotation of the term 'triangle.' Thus the law of inverse variation will hold good only when there is increase or decrease resulting in the formation of a new term.

Increase or Decrease does not relate to increase or decrease of our knowledge.

(*b*) Secondly, the increase and decrease in the denotation or the connotation of a term should not be confused with the increase or decrease of an individual's *knowledge* of such denotation or connotation. Hence a man's knowledge of the denotation or the connotation may change but that does not in any way affect the denotation or the connotation of the term itself. For example, when Columbus discovered America, our knowledge of the denotation of the term 'continent' increased but there was no increase in the denotation of the term itself, and as such there was no corresponding decrease in connotation. Similarly, if with the increase of knowledge it is found that an attribute formerly supposed to form a part of the connotation is not really so, or an attribute not known to form a part of the connotation is found to belong it, there would not be a corresponding change in the notation of the term.

(c) Lastly, the relation of inverse variation should t be taken in the mathematical sense of numerical riation. There is no exact proportion between the gree in which one meaning increases and the other creases. If we add the attribute 'whiteness' to the nnotation of the term 'man,' the denotation will nsist of 'white men' who perhaps form two-thirds the entire population of the globe. If, however, we d the attribute 'blindness,' to the connotation of term 'man', the corresponding denotation would 'blind men', who form a very small fraction. In th cases there is decrease in denotation on account increase in connotation; but though in both cases, ly one attribute is added, the decrease in denotation much greater in the latter case than in the former.

There is no inverse ratio—no numerical variation.

te. Kinds of Connotation.

Some logicians have recognised three kinds of connotation, . Logical, Objective and Subjective Connotation. The *ical Connotation* consists of common and essential attributes sessed by the objects in question. The *Objective Connota-* comprises all the attributes to be found in an object ntial and accidental. The *Subjective Connotation* consists some attributes arbitrarily selected. Thus the Subjective notation of an object is conceived differently by different ons and by the same person at different times. It is clear in Formal Logic we are not concerned with Objective notation or Subjective Connotation.

c. 3. Divisions of Terms

There are some logicians who divide Terms into vocal and Equivocal. As **Jevons** says: "Terms are said e **Univocal** when they can suggest to the mind no than one single definite meaning. They are called **ivocal** or Ambiguous when they have two or more

Univocal and Equivocal Words.

meanings." For example, according to this scheme division, Steam-engine, Railway-train, etc., are Univoc because, they can be used only in one sense; while Fc Lead, Sound, Sleeper, Pulse, Fell, Pound, Vice, etc., a equivocal or ambiguous, because they possess more than c meaning.

This is not a division of terms but a division of words.

Strictly speaking, this is not a division of terms b *a division of words.* Words may possess only one meani and then become univocal or they may possess more th one meaning and become equivocal. But *a term in Lo cannot possess more than one meaning.* According to the L of Identity, if a term be used in a certain sense, it can only used in that sense throughout the entire course of the arg ment. *When a particular word possesses more than one mea ing, it is equivalent to as many terms as there are meani attached to it.* Thus 'Pulse' in the sense of a throb or beat is a different term from 'Pulse' in the sense of peas; 'Pou in the sense of a certain weight is different from 'Pound' in sense of a place for keeping stray cattle.

Different divisions of terms.

Different logicians have recognised different divisions terms, of which the following divisions merit consideration

A. Simple or Composite;
B. Singular or General;
C. Collective or not;
D. Concrete or Abstract;
E. Positive, Negative or Privative;
F. Absolute or Relative; and
G. Connotative or Non-connotative.

Each of the divisions, mentioned above, is independ and every term must fall under one or other of the memb of each. To determine the character of a term we have state under which of the above classes, a particular te may come; in other words we have to state whether a te is simple or composite, singular or general etc. Let us r proceed to discuss each division at some length.

A Simple term consists of one word while a Composite term con-

A. Simple (or Single-worded) and Compos (or Many-worded) Terms.

A term may consist of one word or a combi tion of words. **When a term consists of one wo**

nly, it is called a Simple term or a Single-worded erm: *e.g.*, Man, Student, College, University, etc. **Vhen, on the other hand, a term consists of a comination of several words, it is known as a Compoite term or a Many-worded term:** *e.g.*, This man, n intelligent student, a first-grade College, The 'niversity of Calcutta.

sists of more than one word.

It is clear that a composite or many-worded term ontains some categorematic words, capable of forming terms themselves as well as some syncategorematic words which annot be used as terms by themselves. For example, in the omposite term "The University of Calcutta," the words 'niversity" and "Calcutta" are terms while the words The" and "Of" are merely syncategorematic words.

Imp

. Singular (or Individual) and General (or Common) Terms.

6.

A Singular term denotes one single object while a General term denotes any one of an indefinite number of objects.

A Singular term (or an Individual term) is one hich when used in the same sense can denote only ne single object. For example: the terms 'alcutta," "William Shakespeare," 'The Ganges,' The highest mountain in the World," "A man," "A ook," "This book," "John" are all singular terms cause they signify an individual person or thing. **General term (or a Common term), on the other nd, is one which can be applied in the same sense any one of an indefinite number of objects which semble one another in certain essential qualities;** , Man, Book, Student, Metal, Planet, etc.

Thus the term 'A man' or 'This man' is singular, cause it applies to only one individual person while term "Man" is general, because it is applicable the same sense to any one of the indefinite number individuals called 'men,' by reason of the fact that y possess certain essential attributes in common.

It should be noted that a general term is applicable to any one of an indefinite number of things, not arbitrarily, but by reason of the fact that they possess certain essential attributes in common. Thus a general term not only denotes things but also connotes essential attributes possessed by them in common. It not only indicates certain objects but it also signifies that those objects possess certain likeness. This likeness constitutes the similar objects a class and hence a general term is also called a **Class Term.**

Two classes of Singular Terms.

As for Singular Terms, logicians have recognised that they may be divided into two sub-classes, *viz.*, (*i*) Significant Singular Terms, and (*ii*) Non-significant Singular Terms or Proper Names.

Significant ; and

(*i*) *Significant Singular Terms* point out some one individual thing by referring to some attribute peculiar to it : *e.g.*, the term 'the highest mountain in the world' is a significant singular term, because it refers to a particular mountain on account of its possessing 'the attribute of being the highest,' an attribute which is peculiar to itself.

Proper Names.

(*ii*) *Non-significant Singular Terms* or *Proper Names*, on the other hand, are those singular terms which do not imply any attribute. Logicians in general recognise that Proper Names are non-significant, *i.e.*, they do not possess any connotation. Proper Names are mere signs indicating an individual person place, thing or event, but they do not imply that th individuals denoted by them possess any particula attribute. For example, the Proper Name 'John denotes some individual but does not imply any attribute ; it may refer to any one of the persons bearin that name, not certainly because these various person possess any attributes in common ; in fact, it may b the name of a dog, a horse or even a town. (Se Sec. 3G of this Chapter).

. Collective terms and Non-collective terms: Collective and Distributive uses of terms:—

Collective Terms.

A Collective Term is one which is applied to a roup of similar things, not separately, but as onstituting a single whole. Thus a Collective erm refers to (*a*) a number of separate units (*b*) llected into one whole because of some similarity f the units. For example: Army, Navy, Regiment, ibrary, Crew, Jury, etc. The term 'Army' is llective, because it refers to a number of soldiers, nsidered not separately, but as forming a group.

Non-collective or Unitary Terms.

To a Collective Term, as defined above, there is distinctive opposite name in ordinary use. Hence, e simply call those terms which are not Collective, on-collective. **Coffey,** however, uses the expres- on, "*Unitary Term*" as the antithesis of Collective erm. In a Non-collective or Unitary Term, there is reference to any group considered as one whole. ich Terms, however, should not be called Distributive erms.

Collective and Distributive uses of Terms.

It may be noted that it is only in a very small umber of actually existing groups that language rnishes special collective names. In those cases here such collective names do not exist, we have course to the word "All" in the sense of "all gether." For example: if we say, "All the angles a triangle are equal to two right angles," we use subject term collectively, meaning "all the angles ken together"; while if we say, "All the angles of riangle are less than two right angles," we use the bject term distributively, *i.e.*, all the angles taken arately, and not taken together. This is what is ant by **collective and distributive uses of terms.**

A Collective Term itself may be used collectively or distributively. For example: if we say "The Jury *were* divided in their opinion," we refer to the individual persons composing the Jury and not to the collective whole as such; while, if we say, "The Jury *consists* of nine persons," we use the term in the collective sense indicating that the nine jurors constitute a single whole.

Collective terms may be singular or general.

Collective terms may be singular or general. A Collective term is *singular* if it is capable of being applied to only one group or collection of things, *e.g.*, The English Nation, The Imperial Library of Calcutta, the 49th Bengali Regiment. On the other hand, a Collective term is *general* if it is capable of being used to mean any one of such groups, *e.g.*, Regiment, Library, etc. "Library" is a general collective term because it refers not to any particular collection of books but to any one of the indefinite number of libraries to be found in different parts of the world.

1946.

D. Concrete and Abstract terms.

Imp.

Concrete and Abstract terms.

Another division of terms is into Concrete and Abstract. **A Concrete term is the name of a thing while an Abstract term is the name of an attribute considered by itself.** For example—the terms, Man, Book, College, Triangle are *Concrete*, because they denote things; while the terms 'Humanity' 'Triangularity' 'Whiteness' 'Virtue' etc., are *Abstract*, because they signify attributes.

By a "thing" we mean whatever is regarded as possessing attributes. A thing always possesses attributes and attributes always exist in things. They cannot *exist* apart from each other. But it is possible to *think* of an attribute apart from the thing which possesses it, and an abstract term is the name of such an attribute.

Pair of Concrete

Concrete and Abstract Terms often go in pairs thus: Man—Humanity, Animal—Animality, Miser—Miserliness, and Abstract terms.

—Old age, Substance—Substantiality, Soap—Soapiness, ub—Shrubbiness, Strong—Strength, Square—Squareness, scious—Consciousness, Tired—Tiredness, Endured—lurance, etc. It should not be thought, however, that abstract term exists for each concrete.

Adjectives are Concrete terms.

It should be observed that **Adjectives** are conte, not abstract. If we say, a book is useful, the ective 'Useful' is applied to the book. The term efulness' would be the name of the corresponding lity. Thus the adjectives 'equal' 'good' 'grateful' ional' are names of things and are therefore crete; the corresponding abstract terms would be uality,' 'Goodness,' Gratitude,' 'Rationality.'

Attributives.

Logicians have recognised another class of terms ed "Attributives." **Attributives** are *adjectives or ticiples when not used substantively.* Attributives distinguished from Abstract terms by the fact that can form predicates of propositions, but they can er form subjects of propositions, unless they are ed with other terms. For example: 'human,' 'red,' ve,' 'thinking,' 'running,' (*i.e.*, adjectives and iciples when not used substantively) are attrives and can never be the subjects of propositions hemselves. Thus we may say "Plato is human" if we want to employ the term 'human' as the ect of a proposition, we must add to it some such l as 'being' and say, "This human being is Plato."

ular and General Abstract Terms.

Abstract terms divided into Singular and General.

The question whether Abstract terms can be sub-divided eneral and singular has given rise to considerable difference inion amongst logicians, and all possible views have been The view that they can be so sub-divided appears to be nost reasonable.

An abstract term which is the name of a simp attribute, is *singular*, for though the attribute may possessed by many things, yet it is thought of by us, one and indivisible. Thus though there are many squa things, yet the attribute "Squareness" is only of one kin and it is impossible to think of different kinds of squar ness. Similarly, "Equality," "Truthfulness," "Justice," etc are singular abstract terms.

An abstract term becomes *general*, when it is the nam of a group of attributes, such as 'Colour,' 'Virtue' etc. Ther are various kinds of Colour, such as Whiteness, Rednes Blackness, Greenness, Yellowness etc., and thus th abstract term 'Colour' is general. Similarly there are variou kinds of Virtue, *viz.*, Truthfulness, Charity, Chastit Honesty, Bravery, etc.

E. Positive, Negative and Privative Terms: Infinite Terms.

Positive Negative and Privative terms.

A Positive term implies the presence of a thin or an attribute, *e.g.*, man, human, happy, pleasur pain, etc. **A Negative term implies the absence o a thing or an attribute,** *e.g.*, not-man, non-humar non-happy etc. **A Privative term implies the present absence of an attribute but it also implies th capacity for it,** *i.e.*, to say, Privative terms expres that an object has been deprived of a quality, which previously possessed or was capable of possessing usually and normally does possess, *e.g.*, Blind, Dea Dumb, Lame, Ignorant, Barren etc. A man is calle blind, because though he is destitute of vision, yet h possesses the organs which would have enabled hi to see but for some accident. A tree cannot be calle blind, because it could not have the faculty of seein under any circumstances. Thus privative terms stan midway between positive and negative terms. Lik negative terms, they imply absence of an attribut ut like positive terms, they imply also the capacity f possessing the attribute in question.

Generally speaking, negative terms are those which have negative prefix such as *not, non, un, in, im, dis etc.* But ere are many terms which are negative without possessing ny mark of their negative character, and again, there are rms which are not negative, though they may have negative refixes. In fact, whether a term is positive, negative privative, *depends on the meaning of the term nd not on its mere form.* Such terms as Unpleasant painful), Disagreeable (offensive), Unhappy (Miserable), nwise (foolish), Invaluable (extremely valuable), Unloosed same as loosed), Immoral (vicious), Inconvenient (un-itable), Unholy (impure), Discourteous (Rude), Unkind Cruel), Misfortune (Bad fortune), Senseless (Foolish), In-mous (notorious), Inattentive (Attentive to undesirable atters) etc. are negative in form but positive in character s would appear from their meanings. On the other hand, ch terms as, Alien (one not belonging to a particular untry), Foreign (same as alien), Doubt (absence of belief disbelief), Idleness (want of industry), Darkness (Absence light) etc., are positive in form but negative in meaning.

The character of a term is to be judged with reference to its meaning. Its form may sometimes be deceptive.

As for Privative Terms, we can apply them to ings which have not a quality, though they were pable of having it and normally have it, whereas egative Terms are applied to things which have not d could not have had the quality. It may be stated re that *adjectives and participles may be treated as ivative, whereas the corresponding abstract terms are be regarded as negative.* Thus the terms 'Blind,' eaf,' 'Dumb,' 'Idle,' are privative, referring to rsons who do not possess certain qualities, though ey are capable of possessing them; but the corres-nding abstract terms 'blindness' (absence of vision), afness' (absence of the power of hearing), 'Dumb-ss' (absence of the power of speech), 'Idleness' bsence of industry) are negative.

When a negative term is fully the contradictory of its positive, it is said to be *infinite,* because it stands for all possible terms, except its positive. Thus "not-white" denotes everything except "white". Its sphere is practically infinite or unlimited. **Aristotle** objected to the use of such terms on the ground that they are too vague.

✓

Note. Opposition in Terms: Contradictory and Contrary Terms.

Opposite terms.

Terms implying attributes which cannot co-exist in the same subject are called **Opposite** or **Incompatible Terms.** They may be sub-divided into (*i*) *Contradictory* and (*ii*) *Contrary Terms.*

1946

Contradictory Terms.

(*i*) When two terms mutually exclude each other and at the same time exhaust the entire denotation they are said to be **Contradictory Terms.** For example, the terms "white" and "not-white" are contradictory terms, because, while no thing can possibly possess both these attributes, they taken together apply to all kinds of colour, *i.e.*, they exhaust all kinds of colour.

Contrary Terms.

(*ii*) When two terms connote the greatest degree of difference between the things denoted by them in the sphere within which they are actually applied, they are said to be **Contrary Terms.** For example: the terms, "black" and "white" are Contrary Terms, because, they connote the greatest amount of difference in the sphere of colour. Similarly, "wise" and "foolish"; "strong" and "weak"; "happy" and "miserable" are pairs of Contrary Terms.

Contrary Terms can be both false; but

Contrary Terms and Contradictory Terms agree in this that neither of them can be true of the same thing at the same time. No thing can be both white and black (Contraries); no thing again can be both ite and not-white (Contradictories). But they ffer in this that while Contrary Terms can both be lse of the same thing, Contradictory Terms cannot th be false of the same thing at the same time. A ing may be neither black nor white, but a thing ust be either white or not-white. In the case of ntradictory Terms, there is no intermediate possi-ity—the thing must be one or the other; but in the se of Contrary Terms, we may have a number of ermediate states. For example, besides "white" d "black," there may be blue, yellow etc. (See Ch. The Laws of Contradiction and of Excluded iddle).

Contradictory Terms cannot be both false.

Absolute and Relative terms. 1946

An Absolute Term is the name of a thing or attribute, which has an intelligible meaning by elf and does not necessarily refer to any other ng or attribute. For example: tree, flower, rse, gold, etc.

Absolute terms do not necessarily refer to anything.

A Relative Term, on the other hand, is a name ich derives its meaning only from its relation to nething else. A relative term denotes an object ich cannot be thought of without reference to ne other object or except as part of a larger ole. Thus, the term 'parent' cannot be thought of ept in relation to 'child.' Similarly, a 'Teacher' is tive to 'Pupil,' 'Cause' to 'Effect,' 'Husband' to ife,' 'King' to 'Subjects,' 'Governor' to 'Governed,' eater' to 'Less,' 'North' to 'South,' 'Shepherd' to ock,' 'Guardian' to 'Ward,' etc.

Relative terms necessarily refer to something else.

Relative terms go in pairs and every one of such air of terms is called the *correlative* of the other. some cases, each correlative has the same name,

Relative terms always go in pairs.

e.g., partner—partner, friend—friend, near—near, companion—companion, etc.; in other cases, the correlatives have different names—such as father—child, husband—wife, etc. But they always go in pairs and they always owe their names to the same fact or series of facts. The fact constituting the ground of both the correlative terms is called the *fundamentum relationis* (the basis of the relation). For example, in case of partner, the fact of partnership; in the case of husband and wife, the facts which constitute the marriage tie, etc.

The meaning of the word 'relative' in Logic.

It is true that nothing in the universe is completely independent of other things and in fact, everything must have some relations to something else. All things have a beginning and an end and are influenced throughout the whole period of their existence by the action of other things. Therefore, they are not completely independent and in this sense, all terms may be said to be relative. In Logic, however the word 'Relative' is not used in this sense. In Logic, only those terms are considered 'Relative,' which imply some peculiar and striking kind of relation—the relationship between them being of such an intimate character that *the meaning of one term cannot be understood without a reference to the other.*

Connotative term possesses both denotation and connotation; while Non-Connotative term possesses either denotation or connotation but not both.

G. Connotative and Non-Connotative Terms.

A Connotative Term denotes things as well as connotes attributes while a Non-Connotative Term either denotes things or connotes attributes but not both. Hence a Connotative term possesses both denotation and connotation while a Non-Connotative term possesses either denotation or connotation. To quote the words of **Mill,** "A Non-Connotative term is one which signifies a subject only or an attribute only. A Connotative term is one which denotes a subject and implies an attribute."

It should be noted that the names are confusing. A nnotative term does not mean that it possesses connotation ly but it means that it possesses both connotation and notation. Again, a non-connotative term means that it her possesses connotation only or it possesses denotation only t not both, though it may appear to signify only those terms ich do not possess connotation.

Examples.

For examples: The term 'man' is connotative, cause it denotes 'all men' and connotes the attributes, nimality' and 'rationality.' The term 'white' is nnotative because it denotes all white things such as ow, milk, chalk, lime, eggs etc., and at the same ne connotes the attribute 'whiteness.' The term rtue' is connotative because it denotes different kinds virtue such as truthfulness, chastity, courage, nesty etc., and connotes the quality possessed in mmon by these different kinds of virtue. On the her hand, the term "Squareness" is a non-connotative rm, because it only connotes an attribute but does t denote any object. Similarly, according to most icians, Proper Names such as John, Smith, etc., are n-connotative, because according to them, Proper mes only denote individuals or things but do not nnote any attribute.

Connotative terms :—
(*a*) General terms.

The following classes are **Connotative Terms:**—

(*a*) *All general terms*—whether concrete or tract—are connotative. The term "man" which is concrete general term is connotative, because it notes "all men" as well as connotes the attributes imality" and "rationality." The term "colour" ich is an abstract general term is similarly connove, because it denotes different kinds of colour, h as whiteness, blackness, redness, greenness, owness, etc., and connotes the attribute in which e different kinds of colour agree.

(*b*) Certain Singular terms.

(*b*) *Certain singular terms which denote things and connote attributes.* For example: the terms 'The Sun', 'The Moon', 'The present Vice-Chancellor of the Calcutta University', 'The present Governor of Bengal,' 'The highest mountain in Asia,' 'The largest city in the world' are connotative, because they denote objects and at the same time imply the possession of many attributes by these objects. *Collective Singular Terms* are connotative, *e.g.*, The Calcutta University Corps, The University Law College of Calcutta, etc.

Non-Connotative terms :—

The following classes are **Non-connotative Terms:—**

(*a*) Singular abstract terms.

(*a*) *Singular Abstract Terms.*—These terms are names of definite individual attributes, *e.g.*, Equality, Squareness, Truthfulness, Justice, etc. These are non-connotative terms, because they connote attributes but do not denote things.

(*b*) *Proper Names.*

(*b*) *Proper Names*—According to most logicians, Proper Names are non-connotative, possessing denotation only but no connotation. They denote objects but do not connote any attributes.

Do Proper Names possess connotation ?

Are Proper Names connotative? There is considerable difference of opinion among logicians as to whether Proper Names possess connotation or not. According to some logicians, *e.g.*, **Mill,** they are non-connotative, possessing denotation only but not connotation; while according to others *e.g.*, **Jevons,** they are connotative, possessing both denotation and connotation. Let us consider different views on this question at some length.

Mill—Proper Names do

According to **Mill,** *Proper Names are non-connotative.* As he puts it: "Proper names are not connotative; they denote the individuals who are alled by them, but they do not indicate or imply any ttributes as belonging to those individuals. When we ame a child by the name of Paul, or a dog by the ame Cæsar, these names are simply marks used to nable those individuals to be made subjects of iscourse.”

not possess connotation.

“A proper name is but an unmeaning mark which we onnect in our minds with the idea of the object, in order hat whenever the mark meets our eyes or occurs to our houghts, we may think of that individual object........... Vhen we predicate of anything its proper name; when we ay, pointing to a man, this is Brown or Smith, or pointing o a city, that it is York, we do not, merely by so doing, onvey to the reader any information about them, except hat those are their names. By enabling him to identify he individuals, we may connect them with information reviously possessed by him; by saying, This is York, we nay tell him that it contains the Minster. But this is in irtue of what he has previously heard concerning York; not y anything implied in the name. It is otherwise when bjects are spoken of by connotative names. When we say, he town is built of marble, we give the hearer what may e entirely new information, and this merely by the signification f the many-worded connotative name, “built of marble.” Such ames are not signs of the mere objects,....but signs which ccompany an attribute:......they are not mere marks, but nore, that is to say, significant marks; and the connotation is hat constitutes their significance.”

Jevons, on the contrary, holds that Mill's view erroneous and *Proper Names are connotative,* ossessing not only denotation but also connotation. s he puts it: “Surely no one who uses the name ngland and knows what it denotes can be ignorant f the peculiar qualities and circumstances of the ountry and these form the connotation of the term.”

Jevons—Proper Names possess connotation.

Dr. P. K. Ray attempts to reconcile the con- icting views of Mill and Jevons, and maintains that

Dr. Ray—Proper Names are

at first non-connotative but gradually become connotative.

Proper Names do not at first possess any connotation but as our knowledge increases, they come to acquire connotation. A Proper Name is at first used as a sign for an individual thing, and at that stage no attribute is associated with the name. But as our knowledge of the individual thing increases, we associate its attributes with the name, which suggests afterwards not only the individual thing but also the attributes.

This view is *logically* unsatisfactory.

Dr. Ray's view may be correct from the philological and psychological points of view. From the standpoint of philology or the science of language, a term which does not possess a certain meaning may come to acquire that meaning at a subsequent stage. Again, from the standpoint of psychology or the science of the human mind, the knowledge of individual human beings may change and grow, so that what was not known in the past may come to be known at the present time or at some future period. From the logical standpoint however this view is unsatisfactory because it confuses *connotation* with one's *knowledge of connotation*. In Logic, the connotation of a term is relatively fixed, and does not depend on the state of the knowledge of any particular individual.

The correct view, *viz.*, Proper Names do not possess connotation.

From the logical standpoint, the view of Mill that Proper Names do not possess any connotation appears to be the correct one. The contrary view of Jevons that Proper Names possess connotation is based on a confusion as to the real meaning of the term 'connotation.' Jevons appears to think that *connotation* and *suggestion* mean the same thing. As a matter of fact however connotation should not be confused with suggestion. A term is said to connote attributes when it is *sufficient by itself* to convey the knowledge that the attributes in question are possessed by the object or objects it denotes. On the other hand, a term may suggest attributes *otherwise known*. Hence the view of Jevons that the name 'England' connotes the peculiar qualities of the country incorrect. The name may suggest to some persons ose qualities, which are otherwise known by them it we cannot say that the name by itself implies those ialities. In fact, the Proper Name 'England' need t necessarily imply a particular country; it may the name of a horse, a building or a ship. The :oper Name 'John,' is applicable to a great number individuals but it does not imply that these individuals have any attributes in common. It does not en imply that they are men for we have known en dogs or horses called by that name. Hence we nclude that Proper Names are "unmeaning marks" "arbitrary verbal signs" and do not possess any nnotation; their sole object is to denote an individual.

Carveth Read—Complete enumeration of attributes is not possible.

Carveth Read gives another reason why Proper names ould be considered non-connotative. As he says: "The entific grounds of the doctrine that proper names are nonnnotative, are these. The peculiarities that distinguish an lividual person or thing are admitted to be infinite, and ything less than a complete enumeration of these peculiarities y fail to distinguish or identify the individual. For, short a complete enumeration of them, the description may be isfied by two or more individuals; and in that case the m denoting them is not a proper but a general name, since is applicable to two or more in the same sense. On the er hand, the enumeration of infinite peculiarities is certainly possible. Therefore, Proper names have no assignable notation."

Exercises Worked Out.

Hints.—To describe the logical character of a term means t we have to go through the whole list of logical divisions erms and set down those which are applicable to the given n. As will be seen from Section 3 of this Chapter, we have ignised the following divisions of terms so that in determing the logical character of a term we must state to which he following classes, a term belongs :—

A. Simple or Composite ;
B. Singular or General ;

C. Collective or not ;
D. Concrete or Abstract ;
E. Positive, Negative or Privative ;
F. Absolute or Relative ;
G. Connotative or Non-connotative.

Q. Describe the logical character of the following terms :—(*i*) College ; (*ii*) The University Law College of Calcutta ; (*iii*) The present Vice-Chancellor of the Calcutta University ; (*iv*) The highest mountain in the world ; (*v*) City ; (*vi*) Humanity ; (*vii*) Blindness ; (*viii*) Blind person ; (*ix*) Calcutta; (*x*) Alexander the Great.

[ANSWER.—(*i*) *College*—Simple, General, Collective, Concrete, Positive, Absolute, Connotative.

(*ii*) *The University Law College of Calcutta*—Composite, Singular, Collective, Concrete, Positive, Absolute, Connotative.

(*iii*) The *present Vice-Chancellor of the Calcutta University*—Composite, Singular, Non-collective, Concrete, Positive, Absolute and Connotative.

(*iv*) *The Highest Mountain in the World*—Composite, Singular, Non-collective, Concrete, Positive, Relative (because it necessarily refers to other mountains) and Connotative.

(*v*) *City*—Simple, General, Non-collective (if applied to the persons constituting the city—Collective), Concrete, Positive, Absolute and Connotative.

(*vi*) *Humanity*—Simple, Singular, Non-collective, Abstract, Positive, Absolute and Non-connotative.

(*vii*) *Blindness*—Simple, Singular, Non-collective, Abstract, Negative (meaning absence of power of vision), Absolute and Non-connotative.

(*viii*) *Blind Person*—Composite, General, Non-collective, Concrete, Privative, Absolute and Connotative.

(*ix*) *Calcutta*—Simple, Singular, Non-collective, Concrete, Positive, Absolute and Non-connotative (being a Proper name).

(*x*) *Alexander the Great*—Composite, Singular, Non-collective, Concrete, Positive, Absolute and Non-connotative (being a Proper name).]

Exercise III.

1. What is a Term? What do you understand by the Denotation and the Connotation of a Term? Are Proper names Non-connotative? Fully discuss this question, noticing the different views and giving your own to support it.

2. Distinguish between Words and Terms. Do they come within the province of Logic? If so, how?

3. Discuss the grammatical parts of speech from the logical point of view.

4. Distinguish between Words and Terms. Explain and illustrate the following : (a) Connotative and Non-Connotative Terms ; (b) Absolute and Relative Terms ; (c) Contradictory and Contrary Terms.

5. How do you distinguish between a Word and a Term ? Explain, with illustrations, the distinction between
(a) Contrary and Contradictory Terms,
(b) Absolute and Relative terms,
(c) Negative and Privative terms,
(d) Collective and Distributive uses of terms.

6. Explain with examples the distinction, if any, between a concept and a term. What is an infinite term ?

[**Hints.**—Concept means a general idea. Hence it is a nental state which may or may not be expressed in language ; vhen expressed in language, it becomes a Term, and Logic leals with it ; when not expressed in language, concepts are lealt with in Psychology and not in Logic.]

7. What is meant by the Extension and Intension of Terms ? Arrange the following terms : (a) in the order of heir Extension and (b) in the order of their Intension :— Quadruped animal, Substance, Organic thing, Elephant, Indian elephant, Vertebrate, Mammalian.

[ANSWER.—In order of *Extension*—Substance, Organic hing, Vertebrate, Mammalian, Quadruped animal, Elephant, ndian elephant : In order of *Intension—The reverse order.*]

8. What do you understand by the Connotation of a Term ? Has every term a connotation ? Fully discuss this question, noticing different views and giving your own with easons to support it. What is the relation between the connotation of a term and its denotation ?

9. Distinguish between the Denotation and the Connotation of a Term. How is the distinction connected with hat between Connotative and Non-Connotative Terms ? Name he classes of terms that are connotative and those that are on-connotative.

10. Discuss the question whether there are :—
(i) Terms whose denotation may increase without any change in the connotation ;
(ii) Terms whose connotation may increase without any change in the denotation.

11. Arrange the following terms in order of denotation : ertebrate, Human, Animal, Substance, Child, Organism, chool boy.

[ANSWER.—Substance, organism, animal, vertebrate, uman, child, School boy.]

12. Explain and illustrate the mutual relation of the onnotation and the denotation of a term. Has every term oth a connotation and a denotation ?

13. According to what law is the quantity of extension connected with the quantity of intension? Show that the law holds true of the following series of terms :—Book, printed book, dictionary, Latin dictionary.

14. What do you understand by the Denotation and Connotation of terms? Show they are inseparable aspects of every term. Illustrate your answer.

15. What is meant by the Denotation and Connotation of a term? How far is it true that Denotation and Connotation vary in inverse ratio? Explain by means of concrete illustrations.

16. What do you understand by the denotation and the connotation of a term? Have proper names any connotation? Discuss the question fully, and justify the view you hold with regard to it.

17. Discuss the relation between Denotation and Connotation of Terms. Have Proper names any connotation?

18. What are the various classes of Terms? Explain each of them and give an example of each.

19. Describe the logical character of the following terms :—(1) Equal, (2) Equation, (3) Equality, (4) Inequality, (5) Equalisation.

20. Distinguish giving examples :—

(*i*) Singular, General and Collective terms;
(*ii*) Connotative and Non-connotative terms.

21. Explain and distinguish between collective and distributive uses of terms. Give two examples to illustrate the errors which arise from their confusion.

22. Discuss the following :

"*Popocatapetl* is a non-connotative term to us only so long as we do not know what the Mexicans mean by the word."

CHAPTER IV.

THE PREDICABLES.

EC. 1. The five Predicables : Genus, Species, Differentia, Proprium, Accidens.
EC. 2. Tree of Porphyry.
Exercise IV.

ec. 1. The five Predicables : Genus, Species, Differentia, Proprium, Accidens.

From the preceding chapter it is clear that enotation and connotation are the most important haracteristics of terms. It is further clear that by omparing them with each other we obtain full nowledge of terms. Hence it is possible to compare vo terms—the subject and the predicate of a pro- osition—with each other both as to their denotation nd connotation. The results of such comparison give s all the different ways in which one term can be redicated (*i.e.*, affirmed or denied) of another rm. These different relations are called *Predicables.*

Thus **Predicables are names of different asses of predicates in relation to the subjects.**

Predicables.

Predicate is a term which is either affirmed or denied f the subject. The Predicables are *different kinds of lations which predicates can bear to the subjects.* hese Predicables are five in number, *viz., Genus, pecies, Differentia, Proprium, Accidens.* Thus in ery logical proposition which affirms a relation tween subject and predicate,

predicate
st be either
1. Genus or
2. Species or
3. Differentia or
4. Proprium or
5. Accidens
of the subject.

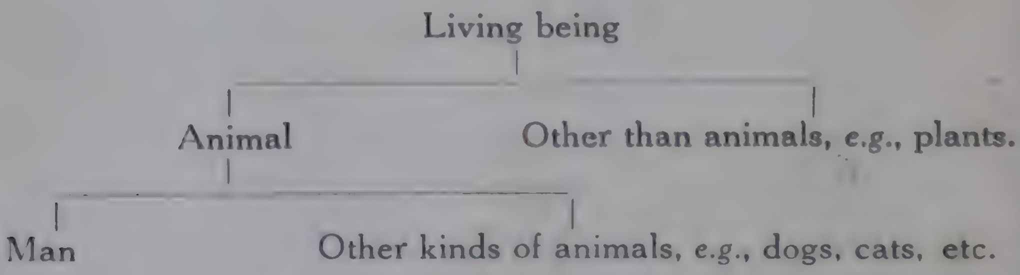
Genus and Species.

Genus =wider class; Species =narrower class.

Genus and Species both stand for classes. Two classes may be so related to each other that the denotation of one of them may be wider than that of the other. For example: the denotation of the class 'Animal' is wider than that of the class 'Man.' **The class of wider denotation is called the Genus in relation to the class of narrower denotation, which is called the Species.** Hence 'Animal' is a genus in relation to the species 'Man.'

Genus and Species are relative.

It is clear that *Genus and Species are relative terms,* one necessarily implying the other. A Genus has no meaning apart from the different Species included in it nor has a Species any meaning apart from the Genus or the wider class, within which it is included. Thus the same term may be a Genus in relation to a narrower class and a Species in relation to a wider class. For example: the class 'Animal' is a genus in relation to the narrower class 'Man,' while it is a species in relation to the wider class 'Living Beings.' Thus:—


Living being
Animal
Other than animals, e.g., plants.
Man
Other kinds of animals, e.g., dogs, cats, etc.

It is quite clear that from the point of view of denotation, the Genus includes the Species but from the point of view of connotation, the Species includes the Genus.

Summum Genus=the

A term is called **Summum Genus** or the highest genus, when it is so wide in extent that there is no ss wider than it. It is the *highest genus* and there- re, there is nothing higher than this. Hence, *the ummum Genus cannot be a Species.*

highest Genus.

A term is called **Infima Species** or the lowest ecies, when it is so narrow in extent that there is class narrower than it. It is the *lowest species* and erefore, there is no class lower than this. Hence, *the fima Species cannot be a Genus.* An Infima Species nnot be further divided into Species or lower classes t only into individuals.

Infima Species=the lowest Species.

The intermediate classes between Summum Genus the one hand, and Infima Species on the other, are lled *Subaltern genera** or *species.* Two or more sses which form Species under the same Genus are lled *Cognate or Co-ordinate Species* in relation to e another, and the nearest genus to every term, of ich the latter is a species, is called the *Proximate nus.*

Subaltern Genera and Species.

Cognate Species.

Proximate Genus.

fferentia.

Differentia is an attribute or a group of ributes which distinguishes one Species from other Species belonging to the same Genus. us the term 'Rationality' is the differentia of term 'Man,' because 'Rationality' is the attribute ich distinguishes men from other kinds of animals. should be noted that the *Differentia is a part of the notation of a term.*

Differentia =the distinguishing attribute of the species —it is a part of the connotation of the species.

We have seen that from the point of view of notation, the Species is wider than the Genus, hin which from the point of view of denotation,

Differentia =connotation of the species

---

* Genus—singular ; Genera—plural. Species is both singular plural

minus the connotation of the genus.

the Species is included. Therefore, *the Differentia is the excess of the connotation of the Species over that of its proximate Genus.* Thus the connotation of the Genus *plus* the Differentia gives the connotation of the Species. For example, 'Animality' (the connotation of the proximate Genus 'Animal') plus 'Rationality' (the differentia of the term 'Man') constitutes the connotation of the term 'Man,' *viz.*, Animality and Rationality.

Proprium or Property.

Proprium follows from the connotation.

A Proprium or Property is an attribute which is not a part of the connotation of a term but which necessarily follows from its connotation; whether as an effect from a cause or as a conclusion from a premise.

As distinguished from Differentia, Proprium is not a part of the connotation but *Proprium necessarily follows from the connotation.* This may happen in two ways, either as a deduction, *i.e.*, a conclusion from a premise, or as an effect from a cause.

For example: All triangles have their three angles equal to two right angles. In this case, 'the attribute of having three angles as equal to two right angles' follows from 'the attribute of being bounded by three straight lines' which constitutes the connotation of 'triangle.' Here the Proprium follows from the connotation as a conclusion from a given premise. Again take the propositition, 'Man has the power of judging' here, the Proprium 'power of judging' follows from 'rationality,' which is a part of the connotation of the term 'Man.' Thus, here the Proprium follows from the connotation as an effect from a cause, 'rationality' being the cause and 'power of judging,' the effect.

A Proprium or Property may be generic or
pecific.. If it follows from the connotation of the
ienus, it is called *generic property;* if, on the other
and. it follows from the connotation of the Species,
is called *specific property.* For example, if we say,
An isosceles triangle has its three angles equal to two
ght angles,' the property, *viz.*, 'the attribute of having
ree angles as equal to two right angles,' follows from
e connotation of 'triangle' (and not from that of
sosceles triangle') and as such, is a generic property.
ut if, on the other hand, we say, 'An isosceles triangle
as two equal angles,' the property 'the attribute of
aving two equal angles' is a specific property follow-
g from the connotation of the species, *viz.*, isosceles
iangles.

Proprium may be generic or specific according as it follows from the connotation of the genus or the connotation of the species respectively.

ccidens or Accident.

**An Accidens or Accident is an attribute which
neither a part of the connotation of a term nor
es it follow from the connotation.** As distin-
uished from Differentia, an Accident is not a part
the connotation of a term; and as distinguished
om Proprium, an Accident does not follow from
e connotation. *Thus all attributes other than conno-
tion and Proprium are Accidents.* An Accident may
removed from the class or individual without neces-
ating any change but a Proprium or Differentia
nnot be removed without changing the very character
the class or individual as the case may be.

Attributes other than connotation and property are called Accidents.

An Accident may belong to a class or to an indivi-
al and in both cases the Accident may be separable
inseparable.

Four kinds of Accidents :—

An inseparable Accident of a class is an attribute
ich belongs to every member of the class, *e.g.*,
ckness in ravens. So far as our experience goes,

(*a*) Inseparable accidents of a class :

(*b*) Separable accidents of a class ;

all ravens are black but blackness is an attribute which is neither a part of the connotation of ravens nor does it follow from such connotation. *A separable Accident of a class* is an attribute which is possessed by some members of the class but is not common to all members, *e.g.*, whiteness in the case of dogs.

(*c*) Inseparable accidents of an individual ;

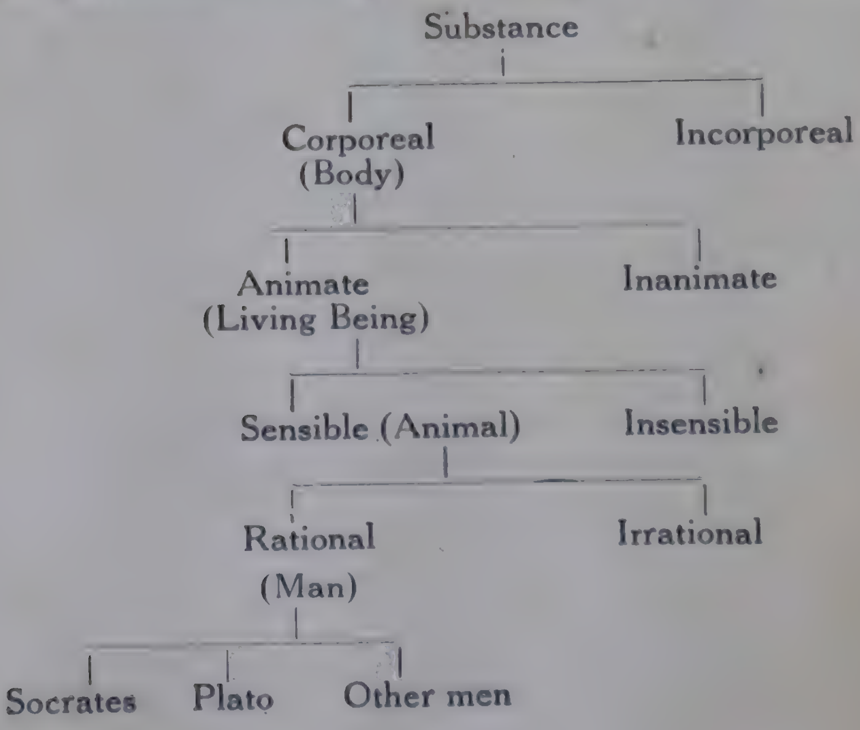
(*d*) Separable accidents of an individual.

An inseparable Accident of an individual is an attribute which belongs to the individual at all times and can never be changed, *e.g.*, the date and place of a man's birth, while *a separable Accident of an individual* is an attribute which is sometimes present in the individual and sometimes absent, *e.g.*, the man's profession, dress, manners, postures, acts, etc.

Sec. 2. Tree of Porphyry.

Tree of Porphyry exemplifies predicables.

The *Tree of Porphyry* exemplifies the chief Predicables. It is named after *Porphyry* (a Neo-Platonic philosopher: 233—304 A.D.) who was the first to set forth the table but is also known as the *Ramean Tree* after the name of Ramus, a logician who flourished in the sixteenth century. The Table is as follows:—


Substance
Corporeal (Body)
Incorporeal
Animate (Living Being)
Inanimate
Sensible (Animal)
Insensible
Rational (Man)
Irrational
Socrates
Plato
Other men

In this table, "Substance" is the Summum Genus d "Man" is the Infima Species, because 'Man' has en divided not into narrower classes or species but ly into individuals, *e.g.*, Socrates, Plato, and other en. The intermediate classes, *e.g.*, 'Body,' 'Living eing,' 'Animal' are Subaltern genera and species— ch being a Genus in relation to the lower class and Species in relation to the higher class. The attributes, orporeal,' 'Animate,' 'Sensible,' 'Rational' constitute e Differentia, distinguishing the species from the enus.

Exercises Worked Out.

Q. To which of the Predicables does each of the follow- g predicates belong?

(*a*) *Even men are animals.*

Answer.—In this proposition, the predicate 'animal' a genus of which the subject 'men' is a Species.

(*b*) *Logic is a good mental discipline.*

Answer.—In this proposition, the predicate 'good mental cipline' is a proprium of the subject 'Logic' because e of the attributes constituting the connotation of 'Logic' is at it is a Science, and the attribute of being a good mental cipline follows from the attribute of being a Science. Thus predicate necessarily follows from a part of the conno- ion of the subject and is therefore, a proprium.

(*c*) *All Negroes are woolly haired.*

Answer.—In this proposition, the predicate "woolly red' is neither a part of the connotation nor does it follow m the connotation. Thus it is neither a differentia nor a prium but an accident. As this attribute is present in all mbers of the class 'Negroes,' it is an inseparable accidens a class.

(*d*) *A fountain pen is usually black.*

Answer.—In this proposition the predicate is a separable ident of a class because it is neither a part of the con- ation, nor does it follow from the connotation and is not nd in all members of the class 'fountain pens' denoted by subject.

(*e*) *Caledonia is Scotland.*

Answer.—Here the subject and the predicate are merely onyms, and can therefore, have no relation of dependence. proposition may, however, be reduced to "Caledonia and

Scotland are names of the same place" in which the predicate 'names of the same place' is a species of the Singular Subject Term. The predicate is an infima species of the subject which is an individual and not a class.

Exercise IV.

1. What are the logical meanings of Genus, Species, Differentia, Property and Accident? Give the Genus and Differentia and also a Property and Accident of *Human being*. If we say, 'No logical writer is truly scientific' what is the logical character of the predicate here?

2. Explain and illustrate *differentia*, *property*, and *accident*. Distinguish between a separable and an inseparable accident and give an example of each.

3. Explain and illustrate the Predicables: and point out their relation to the definition and the description of terms.

4. Give three examples of terms standing to one another in the following relations:—genus and species, species and accidens, species and proprium.

5. Comment upon the following:—

> "Genus is a part of Species and Species is a part of Genus."

6. To which of the predicables does each of the following predicates belong?

(*a*) All the angles of a square are equal.
(*b*) A triangle is three-sided.
(*c*) All Republics are governments.
(*d*) Knowledge is power.
(*e*) Whales are mammals.
(*f*) All ducks are web-footed.
(*g*) The lion is a predatory animal.

7. What do you understand by Predicables? Distinguish between Predicates and Predicables.

CHAPTER V.

EFINITION—ITS LIMITS AND FORMAL CONDITIONS.

EC. 1. Nature of Definition.
Note. Definition and Description : their relation to the Predicables.
EC. 2. Rules of Definition and its fallacies.
Rule 1—Its violation giving rise to fallacies of (*a*) Redundant, (*b*) Accidental, (*c*) Too narrow and (*d*) Too wide definitions.
Rule 2—Its violation giving rise to fallacies of Obscure and Figurative definitions.
Rule 3—Its violation giving rise to fallacies of Synonymous or Circular definitions.
Rule 4—Its violation giving rise to fallacies of Negative definitions.
EC. 3. Limits of Definition.
Exercise V.

ec. 1. Nature of Definition.

Definition is the explicit statement of the tire connotation of a term. The connotation a term consists of common and essential attributes plied by the term, and Definition means a state-ent of the entire connotation.

Definition means statement of the entire connotation.

The time-honoured rule of Definition is that *finition should be per genus et differentiam*, *i.e.*, a tement of the *proximate genus and the differentia* the term.

Rule : Per genus et differentiam.

If we take the *proximate genus in connotation* we ntion all the attributes common to the different cies included under the genus, and when we add *differentia* to it, the statement of the connotation complete, because, thereby, those attributes, which tinguish the species to be defined, from other nate species, are also stated. In other words, in

Connotation of a term= connotation of its proximate genus *plus* differentia.

defining a term, we first of all decide, to what class of things it belongs and then, we mark the attribute or group of attributes, which distinguishes it from other members of that class. For example: we define 'Man' by saying that 'Man is a rational animal,' *i.e.*, 'Man' possesses the attribute 'animality' belonging to its proximate genus 'Animal' and the differentia, 'rationality'; similarly, we define 'triangle' as 'a plane figure bounded by three straight lines': here, the proximate genus is 'plane figure' and the differentia is the attribute 'of being bounded by three straight lines.'

Note. Definition and Description: their relation to the Predicables.

Attributes fall into three groups, *viz.*, those which constitute the *connotation* of a term, those which *follow from* the connotation (called *properties*) and those which neither constitute the connotation nor follow from the connotation (called *accidents*). Now if we state the entire connotation, *i.e.*, proximate genus and differentia we have the *Definition* of the term. If, on the other hand, we enumerate its *properties*, or *accidents*, we have a **Description.** Thus Plato described 'Man' as a *'featherless biped.'* Sometimes in Description, in addition to properties and accidens *a part of the connotation is stated.* For examples : A Horse is an *animal* which has a mane and a tail and which has a high value attached to it; a Tiger is a wild *animal* resembling a cat in features but considerably bigger in size. The object of Description is to enable us, in a rough and ready way to identify the object, of which we are speaking.

The following points may be noticed in comparing Description with Definition :—

(*i*) Definition states the entire connotation, while Description states *properties and accidents and sometimes a part of the connotation.* It is clear, therefore, that all Descriptions are not of equal value. The greater the importance of the ttributes stated in the description, the greater the value of he description for the purpose of identifying the object.

(*ii*) Definition is scientific while Description is *popular*; he object of the former is to make our ideas of things distinct nd clear, while the object of description is to furnish a rough nd ready means of identifying an object.

(*iii*) We should not speak of describing a term. We *efine the term and describe the thing* of which the term is he name.

(*iv*) As definition means a statement of the connotation f a term, *those terms which do not possess any connotation annot be defined*; in such cases the only way to explain them s to describe them by referring to some identifying attribute. t is in this way that Proper names are explained.

ec. 2. Rules of Definition and their violations leading to Fallacies.

Rules :

A definition must conform to the following ules:—

Rule 1. Entire connotation must be stated.

Rule 1.—A definition should state the entire onnotation of the term defined, neither more nor ess.

The connotation of a term consists of *com-non* and *essential attributes*. Hence in defining term, we should avoid inessential attributes. Even ommon attributes should not be mentioned unless hey are at the same time essential attributes. For xample, the connotation of the term 'man' consists f the common and essential attributes 'animality' nd 'rationality' and therefore, the definition of the rm should be 'Man is a rational animal.' Similarly, 'triangle' may be defined as "a plane figure bounded y three straight lines."

Fallacies.

If we violate this rule, we commit fallacies by ating either *more* than the connotation or *less* than ie connotation.

A. If more than connotation :

A. If the definition states *more than the connotation,* the additional attribute would be either (*i*) a property, (*ii*) or an inseparable accident, (*iii*) or a separable accident, respectively leading to the fallacies of *Redundant, Accidental and Too Narrow definitions.*

(*i*) Redundant.

(*i*) If the additional attribute be a *property* (*i.e.,* an attribute, which is not a part of the connotation of the term, but which follows from its connotation), we have the fallacy of **Redundant** Definitions. The additional attribute is a common attribute but not an essential attribute and therefore, it is superfluous to state it in a definition, *e.g.,* the definition 'A triangle is a plane figure, bounded by three straight lines, and *having three angles*' is a redundant definition because the attribute 'having three angles' is superfluous.

(*ii*) Accidental.

(*ii*) If the additional attribute be an *inseparable accident,* (i.e., if it is neither a part of the connotation nor follows from the connota- though it is found to belong to all the things denoted by the term), we have the fallacy of **Accidental** Definition, *e.g.,* the definition 'Man is a *laughing* rational animal' is an *accidental definition,* because the attribute 'laughing' though found in all men, is not a part of the connotation of the term.

Other Examples of Accidental definition:—

Man is a rational animal with two hands and two feet ; Man is an animal that makes clothes for himself ; Rice is an article, which is used as a food in India ; The dog is a domestic animal ; A soldier is a brave man who is ready to die for his country ; A student is a youth attending an educational institution with books ; Gold is a precious metal ; Day is the time between the rising and setting of the sun ; The sun is the star that shines by day ; Man is a house-building animal ; Fishes are animals that live in water ; A gentleman is a person who moves in good society ; A bachelor is a man who looks before he leaps and having looked never leaps at all (McCardie, J.) ; A woman is a creature who cannot reason and who pokes the fire from the top. An ambassador is an honest man sent to lie abroad for the good of his country and a lawyer is an honest man paid to lie at home. (Sir Henry Wotton.)

(*iii*) Too Narrow.

(*iii*) If the additional attribute be a *separable accident*, (*i.e.*, an accident which is possessed by only some of the things denoted by the term, but not by all) we have the fallacy of **Too Narrow** Definition, because it is no longer applicable to the whole term but only to a part of it. The definition 'Man is a *civilised* rational animal' is too narrow because attribute 'civilised' does not belong to all men. Similarly, the definition 'A triangle is a plane figure enclosed by three *equal* straight lines' is *too narrow.*

B. If something less than connotation : Too wide.

B. If the definition states *something less than connotation we have the fallacy of* **Too Wide** finition, for it will apply to a greater number of ngs than are included in the denotation of the term ined. The definition 'Man is an *animal*' is too le because it not only applies to men but to all er animals as well ; similarly, 'Alcohol is a kind of licine' ; 'Diamond is a kind of carbon' ; 'Rock is a d substance,' are too wide definitions.

Rule 2. Definition should not be obscure or figurative.

Rule 2.—The definition should be clearer than the term defined and should not, therefore, be expressed in a figurative, ambiguous or obscure language.

indistinct, hidden

Fallacies :

The violation of this rule leads to the fallacies of **Figurative** and **Obscure definitions.**

Figurative definitions.

Examples of Figurative definitions : The lion is the king of beasts ; Man is the crown of creation ; Necessity is the mother of invention ; Bread is the staff of life ; Music is an expensive noise ; Humour is thinking in jest, while feeling in earnest ; A poet is an apostle of sweetness and light ; Ignorance is a blind guide ; Tact is kindness with brains ; Work is the salt of life ; Procrastination is the thief of time ; Logic is the medicine of the mind ; Childhood is the morning of life ; The child is father of the man ; Time is the moving image of eternity.

179

Obscure definitions.

Examples of Obscure definitions : Dr. Johnson's definition of 'Network' as 'anything reticulated or decussated at equal distances with interstices between the intersections'; 'Pension is an allowance made to any one without an equivalent ; in England it is generally understood to mean pay given to a state hireling for treason to his country ; Fluency is an exuberance of velocity ; A Periphrasis is a circumlocutory cycle of oratorical sonorosity, circumscribing an atom of ideality, lost in verbal profundity ; Eccentricity is peculiar idiosyncrasy ; A girl is a perpendicular biological phenomenon in short skirts ; A girl is an oval mass of bent space being thrown off like electrons from swiftly rotating nithilowatts with all the speed of idio (Einstein).

Rule 3. Definition should not contain the term. defined.

Rule 3.—The definition should not contain the term defined, or a synonym of it.

The violation of this rule leads to the fallacy of **Synonymous definition** or a **Circle in definition** (*Circulus in definiendo*).

Fallacy :—Circular definitions.

Examples : Truth is veracity in speech and action ; Life is the sum of vital functions ; Force is a motive Power ; Man is a human being ; Plant is a vegetable organism ; Gravity is a universal property of matter, in virtue of which every body avitates towards each other ; The Controller of Examinations ntrols University Examinations ; A Scribe is a writer ; Enjoyent means Pleasure ; A Power is a force which tends to oduce motion ; Porosity is a property, which bodies possess having pores ; A glacier is a river of ice ; A Council is a liberative body ; The Sun is the centre of the solar system ; dog is an animal belonging to the canine species ; A Judge a lawyer who exercises judicial functions ; Productive labour eans labour productive of wealth ; A verbal contract need t be in writing.

Rule 4.
Definition
should not
be negative.

Rule 4.—A definition should not be negative, hen it can be affirmative.

A definition should state what the term means, it a negative proposition merely states what a term es not mean. Hence, a definition should not be gative, if it be possible to make it affirmative.

Fallacy :
Negative
definitions.

The violation of this rule leads to the fallacy **Negative Definitions.**

Examples : Vice is not Virtue ; Right is not Wrong ; ind is not Matter ; Liquid is that which is neither a solid r a gas ; Failure is but the want of success ; Ignorance is lack knowledge ; Tranquillity is the absence of unrest ; Peace is absence of War ; Sleeping is the opposite of waking.

Sometimes, when we find it difficult or impossible define a term, the so-called Negative definition may ve the purpose of a description.

To sum up: **A definition should be adequate, ecise, clear and should not be tautologous or gative.**

c. 3. Limits of Definition.

The limits of Definition are the following:—

Summum
Genus.

(*a*) **Summum Genus** cannot be defined. A inition should be *per genus et differentiam*. The

Summum Genus, being the highest genus, cannot be brought under any higher genus, and as such cannot be defined.

Singular abstract names.

(*b*) **Singular Abstract Names,** being names of elementary attributes, cannot be defined because there is nothing simpler or more elementary than they, *e.g.*, Equality, Squareness etc., cannot be defined.

Proper names and Individual objects.

(*c*) **Proper Names and Individual Objects.** Proper names do not possess any connotation, and as such there cannot be a statement of their connotation. Individual objects possess an infinity of attributes and a complete enumeration of all the attributes is impossible. Hence they cannot be defined. The only way to explain them is to resort to some description, suitable to the occasion.

Exercises Worked Out.

Q. Test the following definitions:—

(*a*) *A dog is a domestic animal.*

Answer.—This is not a logical definition because the words "domestic animal" are merely an *accidens* of a dog. Instead of the entire connotation, a mere *accidens* has been stated. Hence this is an *accidental definition* or a mere *description.*

(*b*) *A poet is an apostle of sweetness and light.*

Answer.—This apparent definition involves the fallacy of *figurative definition* because in this case instead of stating the entire connotation only a figurative description is given.

(*c*) *A Scribe is a writer.*

Answer.—This apparent definition involves the fallacy of *circular definition* because the word 'writer' is a mere synonym of the word 'Scribe'.

(*d*) *Tranquillity is the absence of unrest.*

Answer.—This involves the fallacy of *negative definition* because the expression 'absence of unrest' merely states what 'tranquillity' is not but a logical definition should state what it is.

(*e*) *Lions are like the animal in the picture.*

Answer.—This is a mere description by type and not a logicial definition because it does not state the connotation.

Exercise V.

1. Definition has been defined as "a statement of the notation of a name," "an exposition of the comprehension a concept," "an analysis of the essential nature of real things far known." Explain the meaning of these statements your own words. What do you consider to be the most equate statement of the nature of definition as used in nce and common life?

2. What do you understand by Logical Definition? Can ry term be defined? If so, why so? If not, why not?

3. Does the definition of a term include all the common perties of the class named? If not, which are the common perties that should be included?

4. Why is it that some terms can, and others cannot, defined?

5. What are the principal faults in Definition? Give mples.

6. Examine the following definitions :—

(*i*) A square is a four-sided figure whose four sides are equal and whose angles are right angles.
(*ii*) An archdeacon is a person who exercises archdeaconal functions.
(*iii*) A gentleman is a man with no ostensible means of subsistence.
(*iv*) Silver is a metal less valuable than gold.
(*v*) Paper is a substance made of rags.
(*vi*) A right-angled triangle is a triangle containing one right angle and of which the containing sides are either equal or unequal.
(*vii*) Man is a self-conscious being.
(*viii*) Rust is the red desquamation of iron.
(*ix*) Man is a bundle of habits.
(*x*) Law is nothing but strong commonsense.
(*xi*) Logic is a mental science.
(*xii*) Hunger is the product of men's reflection on the utility of food.

7. Illustrate by a concrete example that Definition should *per genus et differentia.*

8. Explain 'Circle in definition.' Examine the following nitions, and explain in each case if it is faulty, why it is

(*a*) Time is the moving image of eternity.
(*b*) A gentleman is a person who moves in good society.
(*c*) A judge is a lawyer who exercises judicial functions.
(*d*) Peace is the absence of War.

9. State and illustrate the logical rules of a sound Definition, and determine the relation of Definition to the Predicables.

10. State and illustrate the distinction between Definition and Description. Examine the following definitions :—

(*a*) A pharmacy is a drug store.
(*b*) Knowledge is power.
(*c*) Mind is a thinking substance.
(*d*) Life is the continuous adjustment of inner to outer relations.

11. Enunciate, with examples, the rules of Logical Definition, indicating the fallacies that arise from their violation. State and illustrate the Lmits of Definition.

12. Point out the relation of the Predicables to the definition and description of terms.

HINTS.—In detecting fallacies in definitions it may often happen that a given example illustrates violations of more than one rule. Hence in every case, it is necessary not only to name the fallacy but also to give reasons why a particular definition is faulty.

CHAPTER VI.

LOGICAL DIVISION.

1. Nature of Logical Division.
   Note. Division and Definition.
2. Rules of Logical Division and their violation leading to Fallacies.
   Rule 1.—its violation leading to the fallacies of Physical division or Metaphysical division.
   Rule 2.—its violation leading to the fallacy of Cross division.
   Rule 3.—its violation leading to the fallacies of two narrow or too wide divisions.
   Rule 4.—its violation leading to the fallacy of Overlapping division.
   Rule 5.—its violation leading to the fallacies of Physical division or Metaphysical division.
   Rule 6.—its violation leading to the fallacy of too narrow division.
3. Division by Dichotomy.
   Exercise VI.

c. 1. Nature of Logical Division.

Logical
Division is
different
from

**Logical Division is the splitting up of a genus
higher class into its constituent species or lower
sses according to a certain principle.**

Logical Division is thus the analysis of the
otation of a term, as Logical Definition is the
ement of its connotation. Logical Division does
mean an enumeration of the things denoted by the
n, but the splitting up of a genus into its constituent
ies. Thus, *Logical Division is always division of
lass into sub-classes* and not a division of an in-
dual thing into its different parts.

Logical Division must be distinguished on the one hand,
Physical division or partition and on the other hand, from
aphysical division.

Physical Division and

Physical Division or Partition means the analysis or separation of an individual thing into its constituent parts; for examples : the division of a plant into its roots, trunk, branches, leaves, etc. ; the division of man into head, trunk, hands, feet, etc. ; the division of triangle into its three sides.

Metaphysical Division.

Metaphysical Division, on the other hand, is an analysis of a thing or class of things into its attributes, *e.g.*, if we analyse the qualities of glass into something hard, brittle, transparent, etc., we have an example of metaphysical division ; similarly, if we analyse the qualities of 'man' into 'animality' and 'rationality,' we have a Metaphysical Division. Metaphysical Division is also called *Conceptual Analysis.*

Both Physical division and Metaphysical division should be distinguished from Logical division, which cannot be applied to an individual thing or attribute but only to a class of things or attributes.

Fundamentum divisionis.

In Logical Division, we think of an attribute, which is possessed by some members of the class and not by others, and thus have the *fundamentum divisionis*, i.e., the principle of division. For example, in dividing the class 'Man,' we find that some men are civilised, while, others are not, hence we adopt as the principle of division, the presence or absence of the attribute of being civilised. It is obvious that the same class can be divided into different sub-classes, according as the principles of division are different. Thus men can be divided into white and not-white; tall and not-tall; civilised and non-civilised; good and not-good; Europeans and non-Europeans, etc.

Note. Division and Definition: While Division deals with the denotation of terms, Definition deals with their connotation. Now, most terms possess both denotation and connotation, and these two meanings are intimately related to each other, and in fact may be said to constitute two aspects of the

me thing. Hence Division and Definition taken
gether unfold the full meanings of terms. Divi-
on shows what sub-classes are contained in the
gher class represented by the term while Defini-
on clearly states their common and essential
tributes. Thus Division and Definition are
pplementary processes.

ec. 2. Rules of Logical Division and their violations leading to Fallacies.

Logical Division should conform to the following
les which follow from the very nature of the
ocess :—

Rule 1.—Logical Division is always of a class
d not of an individual. For example, we can
gically divide the term 'Man,' but we cannot
gically divide 'Alexander the Great.'

Rule 1. Logical division is of a class.

This is involved in the very definition of Logical Division.
is this characteristic, which distinguishes Logical division
m Physical division, on the one hand, and from
taphysical analysis, on the other.

Fallacies.

Rule 2.—Logical Division must have at a
e only one fundamentum divisionis or principle
division, *viz.*, the presence of a particular attri-
te in some members, and its absence in other
mbers, of the class divided. Thus 'student' may
divided into intelligent and non-intelligent—the
nciple of division being, the presence of intelligence
some students, and the absence of intelligence in
ers.

Rule 2. There must be only one principle of division.

The violation of this rule leads to the fallacy of **Cross**
ision ; for example : A division of 'Man' into tall, white,
lised and European ; evidently, this division involves four
ciples, *viz.*, varieties of stature, of colour, of culture and
ace ; division of 'triangle' into equilateral and right-angled ;

Fallacy.

here two principles are involved, *viz.*, varieties of sides and of angles.

Rule 3.
The sub-classes must be co-extensive with the class divided.

Rule 3.—In a Logical Division, the sub-classes, into which the term is divided, must be together co-extensive with the whole. In other words, the denotation of the sub-classes, taken together, must be equal to the denotation of the class divided. For example, if we divide 'Material bodies' into Solids, Liquids and Gases, the sub-classes, taken together, cover the entire denotation of the term, 'Material Body.'

Fallacies.

The violation of this rule leads to the fallacies of either *too narrow* divisions or *too wide* divisions. If we omit a species, the division is **too narrow** ; for example ; the division of 'Triangle' into equilateral and isosceles (the species 'scalene' being omitted). If, on the other hand, we include classes which do not fall under the genus to be divided, the division **is too wide.** For example : the division of coins into gold, silver, bronze, nickel, copper and *bank notes*.

Rule 4.
The sub-classes must not overlap.

Rule 4.—In a Logical Division, the sub-classes must not overlap but must be mutually exclusive.

This rule means that no individual should belong to more than one of the sub-classes. For example: If we divide 'Triangle' into equilateral, isosceles and scalene, the sub-classes exclude one another, no triangle belonging to more than one group.

This rule follows from Rule 2, according to which there must be one *fundamentum divisionis* at a time. If there be one principle of division, the sub-classes will exclude one another, but if there be more than one principle of division, the sub-classes will be found to overlap one another, as shown in the above example.

Fallacies.

The violation of this rule gives rise to the fallacy of **Overlapping Division.** For example : if we divide 'Man' into white and tall, we commit this fallacy because, white men may be tall and tall men may be white, and thus the sub-classes overlap each other.

Rule 5.—The name of the class divided should e applicable, in the same sense, to each of the ıb-classes. For example: the name 'triangle' is pplicable to each of the sub-classes, *viz.*, equilateral, osceles and scalene.

Rule 5. The name of the class should be applicable to the sub-classes.

This rule follows from Rule 3. If there be a sub-class to hich the name of the class is not applicable, then clearly, the enotation of the sub-classes taken together must be greater an the denotation of the class divided.

The violation of this rule leads to the fallacy of **Physical vsion or Metaphysical division.** For examples: If we vide, 'Man,' into head, trunk, hands, feet, etc., the name nan' is certainly not applicable to the different parts of the ody taken separately. Similarly, if we divide Asia into Japan, hina, Turkey, Persia, India, etc., it is not a Logical division, ecause, the name of the continent cannot apply to any of its rts, considered separately. Both these are examples of ysical division. Again, if we analyse the attributes of 'man' to 'animality' and 'rationality,' the class name 'man' cannot applied to any of its attributes. Thus, this is an example Metaphysical division and not of Logical division.

Fallacies.

Rule 6.—In a continued Division each step ould divide a class or sub-class into its proximate b-classes. *Divisio non faciat saltum*—Division ust not make a leap. When a Logical Division volves more than one step, it should be conuous, proceeding step by step without omitting y intermediate species.

Rule 6. Division should be into proximate classes.

The violation of this rule usually leads to the fallacy of **narrow** division. Thus rectilinear plane figures should not divided immediately into such remote species as equilateral ıngles, squares, parallelograms, etc.

Fallacy.

In conclusion, it may be noted that as the rules given ove are all interconnected, the violation of one of them y at the same time involve violation of other rules as well. nce we find that a particular illustration often exemplifies re than one rule.

Sec. 3. Division by Dichotomy.

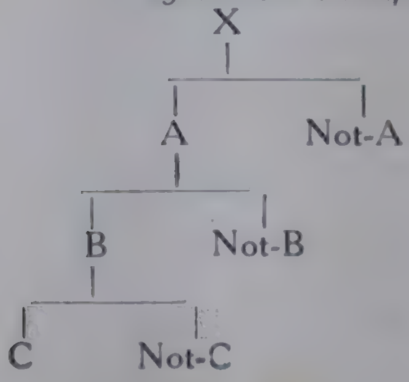
Division by Dichotomy is a formal process.

According to the Rules of Division, as we have seen, there should not be more than one principle of division, the sub-classes must not overlap and when taken together the sub-classes should be equal to the class divided. Now, it is clear that we cannot be certain that a particular logical division conforms to rules, except with a knowledge of the things denoted by the class to be divided. In Formal Logic, however, such a knowledge of things is wanting and that is why some Logicians consider Division, a part of Material Logic. Hence Formal Logicians have formulated a kind of division called by them—**Division by Dichotomy,** in which, from the mere *form* of the division, without any knowledge of the subject-matter divided, we may be certain that the rules of division have been observed.

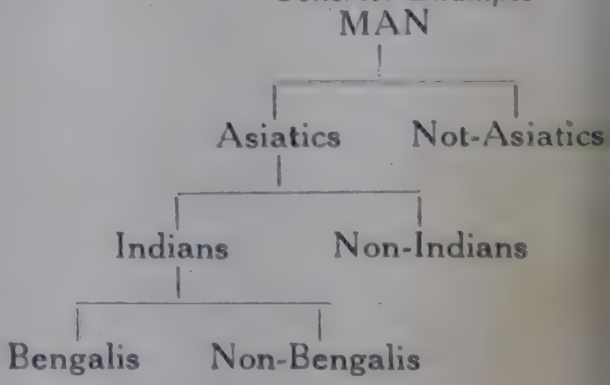
It is division into two sub-classes—one represented by a positive and the other by its corresponding negative term.

Division by Dichotomy (lit.-cutting into two) means division of a higher class at each step into two sub-classes—one of which is represented by a positive term and the other by its corresponding negative. As the two sub-classes are positive and negative terms, there cannot be more than one principle of division; the two sub-classes according to the Principles of Contradiction and Excluded Middle, must be mutually exclusive and taken together, must be equal to the denotation of the class divided. Thus, by this method, the rules of division are observed and yet a knowledge of the subject-matter is not necessary.

Symbolical Example



Concrete Example



Its strength and weakness.

Division by Dichotomy is chiefly valuable in this, at it ensures the completeness of a division. It is *rmally* perfect, because it is based on the Laws of ontradiction and Excluded Middle. It is however, en to the serious objection, that at each step of the vision, the sub-class represented by the negative term vague and indefinite.

Exercises Worked Out.

Hints.—As in the case of Logical Definition so in gical Division, a given example may involve more than e fallacy. Hence in examining a given division, we should t only mention the name of the fallacy, but state the asons why it is fallacious. For instance, in criticising the vision of man into tall, civilised, honest, we may say that involves the fallacy of *Cross Division*, because there is ore than one principle of division ; or that it involves the llacy of *Overlapping Division*, because the sub-classes overlap e another.

Q. Test the following divisions and state whether they logically correct :

(*a*) *Plants into stem, root and branches.*

ANSWER.—This is not a Logical Division but a Physical vision because a particular plant is being separated into constituent parts.

(*b*) *Mind into Feeling, Thinking and Willing.*

ANSWER.—This is not a Logical Division but a Metaphyal Analysis because 'Mind' is here analysed into its attributes.

(*c*) *Men into white and black, rogues and murderers.*

ANSWER.—This involves more than one fallacy. Firstly, it lates the rule that there should be only one principle of ision at a time. In this example there are several principles. ., colour and morality. Hence, this illustrates the fallacy Cross Division. Secondly, this also involves the fallacy Overlapping Division because the sub-classes, *e.g.*, white n and rogues do not exclude each other ; an individual y belong to both classes.

(*d*) *Statesmen into efficient, democratic, imperial and lthy.*

ANSWER.—Firstly, this division involves the fallacy of ss Division because instead of one, there are at least e principles of division, *viz.*, "capability of doing work," nd of political theory held," and "possession of wealth."

Secondly it also involves the fallacy of Overlapping Division because one individual may belong to more than one class, *e.g.*, a statesman may be both efficient and democratic.

Exercise VI.

1. Explain and illustrate with concrete examples, the nature of Logical Division, and determine its relation to Definition.

2. What is Logical Division? State and exemplify the rules of Logical Division, illustrating the fallacies which arise from the violation of these rules. What is Division by Dichotomy?

3. Explain the nature and use of Logical Division. Illustrate your meaning by an example. State and exemplify the faults to be avoided in Division. Metals may be divided into white, heavy and precious; examine this division.

4. In writing an essay you apply both Definition and Division. Explain for what purposes you apply them.

5. Distinguish between Logical, Physical and Metaphysical Division.

6. Show how Definition and Division are related to each other.

7. Test the following divisions:—
   (*a*) Pens into Steel pens and Quill pens.
   (*b*) Animals into vertebrate and invertebrate.
   (*c*) Materials bodies into Solids, Liquids and Gases.
   (*d*) Colour into whiteness, blackness and greenness.
   (*e*) Indians into rich, poor, malarious and consumptive.
   (*f*) Lights into artificial light, red light, and moon-light.
   (*g*) Terms into Singular, Abstract and Connotative.
   (*h*) Men into civilised, tall, honest and clergymen.
   (*i*) Human beings into men, women and children.
   (*j*) Chair into legs, back and seat.
   (*k*) Human nature into body, mind and spirit.
   (*l*) Grammar into Syntax and Prosody.
   (*m*) Books into moral, immoral and clever.
   (*n*) Trains into local and electric.
   (*o*) Man into civilised, uncivilised, clergymen and laymen.
   (*p*) Great Britain into England, Scotland and Wales.
   (*q*) Snakes into poisonous and harmless.
   (*r*) 'Fish, flesh, fowl and good red-herring.'
   (*s*) A Room into roof, floor, walls and ceiling.

CHAPTER VII.

PROPOSITION.

c. 1. Analysis of a Logical Proposition.
Note. Grammatical Sentence and Logical Proposition.
c. 2. Kinds of Propositions.
A. Simple and Compound.
B. Division according to Relation—Categorical and Conditional.
C. Division according to Quality—Affirmative and Negative.
Note 1. Quality of Hypothetical Propositions.
Note 2. Quality of Disjunctive Propositions.
D. Division according to Quantity—Universal and Particular.

Note 1. Singular Propositions.
Note 2. Universal Propositions.
Note 3. Quantity of Hypothetical Propositions.
Note 4. Quantity of Disjunctive Propositions.
E. Division according to Modality—Necessary, Assertory and Problematic.
F. Division of Propositions according to Import—Verbal and Real Propositions.
. 3. Simplification of Propositions—Forms of Propositions according to Quality and Quantity—A. E. I. O.
. 4. Reduction of Sentences into their logical form of Propositions.
. 5. Distribution of Terms.
Note. Quantification of the Predicate.
. 6. Representations of the four kinds of Propositions by means of Diagrams. Euler's Circles.
Exercise VII.

c. 1. Analysis of a Logical Proposition.

Proposition.

A Proposition is the statement of a certain ation between two terms. It thus consists of e parts, *viz.*, two terms and the sign of relation ween them. Of the two terms, one is called the

its three parts :

subject, the other is called the *predicate* and the sign of relation is known as the *copula*. The **subject** of a proposition is the term, about which something is stated (*i.e.*, affirmed or denied); the **predicate** is the term, which is stated (*i.e.*, affirmed or denied) about the subject; and the **copula** is the sign of affirmation or denial. For example, in the proposition "Man is not perfect," the terms "Man" and "Perfect" are the subject and the predicate respectively, while the words "is not" which stand as the sign of relation constitute the copula.

Subject.

Predicate.

Copula.

There is some controversy amongst logicians as to the nature of the Copula and this controversy centres round two questions, *viz.* (*i*) Firstly, does the Copula consist of the present tense of the verb 'to be' or does it consist of any tense? (*ii*) Secondly, is the Copula always affirmative or may it be both affirmative and negative, according to circumstances?

The Copula consists of the present tense of the verb 'to be' with or without the negative particle.

(*i*) With regard to the first question, **Hamilton, Mansel, Fowler,** etc., have adopted the view that *the Copula is always in the present tense*, while **Mill** holds that it may be in *any tense*. Without entering into details of this controversy, it may be pointed out that the Copula expresses a relation between the subject and the predicate, and as such, it does not admit of variation in tense. Hence, it should be in the present tense. The Copula should be free from the element of time, which should be referred to the predicate. For example, instead of saying "Socrates was a great philosopher," we should in Logic say "Socrates *is* a person who was a great philosopher," in which the element of time is referred to the predicate. Similarly, the proposition "The steamer will sail in the afternoon," when expressed in logical form should stand thus—"The steamer *is* a vessel which will sail in the afternoon."

Hence we accept the view that *the Copula should always consist of the present tense of the verb 'to be'*. The different forms of the present tense of the verb 'to be' are—*am*, *are*, *art* and *is*. The Copula may take any of these forms, according to circumstances.

Copula may be affirmative or negative.

(*ii*) With regard to the second question, some logicians d that the Copula should always be expressed in an affirma- form, while others maintain that it may be both affirmative l negative, as circumstances might require. Those who hold view that the Copula should be always affirmative attempt transfer the sign of negation "not" to the predicate. Instead saying "Man is not perfect" they would say "Man is not-fect." It may be pointed out, however, that affirmation and ation are fundamentally different and stand for distinctions ich cannot be got rid of by manipulation of words. Hence accept the view that the Copula may be affirmative or ative, according as the relation between the subject and predicate is one of affirmation or denial.

We, therefore, conclude that **the Copula should in the present tense of the verb 'to be' and may affirmative or negative.**

In other words, the Copula may take any of these ms, viz., *is* or *is not; are* or *are not; am* or *am not;* l lastly, *art* or *art not.*

There is another point which should be noted in con-tion with the Copula.

The Copula should not be confused with the substantive verb 'to be.'

The Copula merely *expresses a relation between two terms;* copula by itself does not either assert or deny the tence of the subject or the predicate. It is merely gn of agreement or disagreement between the subject and predicate. Thus, when we say, "Gold is yellow" we do want to assert the existence of Gold we merely state a tion between Gold and Yellow. This becomes quite arent, when we consider such propositions as "The Centaur mythical beast," "The golden mountain is a fiction," etc. s *confusion occurs because the verb "to be" sometimes ns "to exist".* For example: "Evil is" means "Evil s." In a proposition of this kind, "Is" includes the licate as well as the copula, and the proposition may be ressed more fully by saying "Evil *is* existing". Thus, the ıla as the connecting particle should not be confused with substantive verb.

Note. Grammatical sentence and Logical proposition.

A sentence indicative comes nearest to a logical proposition.

What is called a proposition in Logic roughly corresponds to what is known as a sentence in Grammar. But though every logical proposition is a grammatical sentence, it is not true that every sentence is a proposition. There are various kinds of sentences which are distinct from propositions, *e.g.*, a sentence *interrogative* or question, a sentence *optative*, *i.e.*, what expresses a wish, a sentence *imperative* or command, a sentence *exclamatory*, which expresses wonder. The logical proposition has its nearest approach in a sentence *indicative* and the other kinds of sentences can only be considered in Logic when they are reduced to the form of a sentence indicative. We have seen that a proposition has three parts, *viz.*, the subject, the predicate and the copula and even a sentence indicative often requires to be re-written in order that it may be reduced to the strict logical form.

Sec. 2. Kinds of Propositions.

A. Simple and Compound.

Simple proposition means one proposition, and Compound means more than one.

A proposition, we have seen, is the statement of a certain relation between two terms. **If there be only one such statement, the proposition is called Simple,** *e.g.*, All men are mortal. No man is perfect. **If, on the other hand, there is more than one such statement, the proposition is called Compound,** *e.g.*, Napoleon was both a great conqueror and a great statesman, which is really equivalent to two propositions, *viz.*, Napoleon was a great conqueror and Napoleon was a great statesman. Similarly, the proposition, Man is neither immortal nor perfect, may be split up into the two propositions, Man is not immortal and Man is not perfect. A Compound proposition is therefore equivalent to *more than one proposition.*

Compound propositions may be sub-divided into *Copulative*
Remotive. **A Copulative proposition** is a compound pro-
tion, consisting of *more than one affirmative* proposition,
e a **Remotive proposition** is a compound proposition con-
ng of *more than one negative* proposition.

Copulative and Remotive.

. Division according to relation—Categorical and Conditional.

Propositions are divided into *Categorical* and
ditional, according to *Relation, i.e.,* according to
nature of the affirmation or denial. A
egorical proposition is one, in which the relation
ween the subject and the predicate is without
condition, in which the predicate is either
rmed or denied of the subject unconditionally;
All men are mortal; No man is perfect; Some
lents are intelligent; Some men are not wise, etc.
all these cases, the relation beteewn the subject
the predicate is not subject to any condition.
onditional proposition, on the other hand, is
in which the affirmation or denial of the relation
ween the subject and the predicate is made under
ertain condition, *e.g.,* If he comes I shall go;
were rich I would be happier; He will either go
ollege or stay at home etc. In all these cases, the
ement of the relation is subject to some circums-
e, which must be granted or supposed, before it
mes applicable.

Categorical=unconditional.

Conditional =subject to some condition.

Conditional propositions are of two kinds, *viz.,*
othetical propositions and *Disjunctive* propositions.

Two kinds of Conditional propositions.

A Hypothetical *proposition is a conditional*
osition, in which the condition is introduced by

Hypothetical "If — then."

the conjunction "If" or some other word equivalent to it; e.g., If he comes, I shall go; If it rains, he will not come; If iron is rusty, it becomes brittle; Where there is a will there is a way; Should he meet me, he would have known me at once; Were I in his place, I would not do it; Had he come, I would have gone; etc. A Hypothetical proposition consists of two parts —the *antecedent* and the *consequent.* The **antecedent** of a hypothetical proposition is that part of it which contains the condition, and the **consequent** is that part which contains the statement. In the first three of the given examples, the antecedents are "If he comes," "If it rains," "If iron is rusty," while the consequents are "I will go," "He will not come," "It is brittle" respectively. When hypothetical propositions are given in strict logical form, the part which contains the condition, precedes the part which contains the statement, as in the examples given above. It is for this reason that the part containing the condition is called the antecedent (or that which precedes) and the part containing the affirmation or denial is called the consequent (or that which follows). Thus, the hypothetical proposition "I shall go, if he comes" is not in strict logical form, because the antecedent "If he comes" does not precede the consequent "I shall go." Reduced to logical form, it should stand as "If he comes, I shall go."

Disjunctive "Either—or"

✓ A **Disjunctive** *proposition is a conditional proposition, which makes an alternative assertion, its two members being disjoined by "Either—Or."* Thus a Disjuctive proposition is of the form: "Either he will come or I shall go;" "Either he is a prophet or an imposter;" "He is either a fool or a knave."

Division according to Quality—Affirmative and Negative.

Affirmative and Negative Propostions.

According to *Quality*, propositions are divided *Affirmative and Negative.* **An Affirmative Pro- ition is one, in which the predicate is affirmed the subject,** *e.g.*, "Man is mortal."' **A Negative position, on the other hand, is one in which the dicate is denied of the subject,** *e.g.*, "Man is perfect."

In Affirmative propositions, the copula is affirma- , *i.e.*, it has no negative sign, while in Negative positions, the copula is negative, *i.e.*, it has a nega- sign attached to it, *e.g.*, the proposition 'Man is rtal,' is affirmative while the proposition "All men not wise" is negative. When a Negative Cate- ical proposition is of universal quantity it is stated s—"No S is P", "No man is perfect." In this , we find that the negative sign is detached from copula and associated with the subject. This, ever, is a mere accident of language.

Can all negative propositions be reduced to affirmative propositions?

Some logicians have attempted to reduce all negative ositions to an affirmative form by regarding the negation part of the predicate. Thus instead of saying, "No man rfect," they would say "All men are not-perfect" etc. Thus sign of negation is transferred to the predicate. Such ositions are called *Infinite Propositions.* Thus Infinite ositions have affirmative copulas and as such are affirmative orm, though their force is chiefly negative. We have, ever, seen that affirmation and negation are fundamentally rent and as such the distinction between affirmative and tive propositions should be maintained.

e 1. Quality of Hypothetical Propositions.

Quality of Hypotheti-

The quality of a hypothetical proposition depends on the ty of its consequent. The quality of the antecedent does cals depends on quality of consequents.

not determine the quality of the proposition, because the antecedent only contains the condition and not the statement of relation. Thus if the consequent be affirmative, the Hypothetical proposition is affirmative; if the consequent be negative, the Hypothetical proposition is negative ; thus :

Affirmative Hypotheticals.	*Negative Hypotheticals.*
(1) If A is B, C is D.	(1) If A is B, C is not D.
(2) If A is not B, C is D.	(2) If A is not B, C is not D.
(3) If he comes, I shall go.	(3) If he comes, I shall not go.
(4) If it does not rain, I shall go.	(4) If it does not rain, the ground will not be wet.

There are some logicians who regard all Hypothetical propositions as affirmative. According to them, Hypothetical propositions express that there is a relation of dependence between the consequent and the antecedent. But this view raises needless complications.

Note 2. Quality of Disjunctive Propositions.

No distinction of quality.

Disjunctive Propositions do not admit of a distinction of quality, because there are no negative forms. Thus **all Disjunctive Propositions are affirmative.** Thus the proposition "A is neither B nor C" is not a disjunctive proposition at all, because, here, there is no alternative predication but only a *double denial, viz.*, 'A is not B', and 'A is not C'. This is a Compound Categorical proposition belonging to the Remotive variety.

D. Division according to Quantity—Universal and Particular.

Universal and Particular Propositions

As to *Quantity*, propositions are divided into *Universal and Particular*. **A Universal Proposition is one, in which the predicate is affirmed or denied of the whole subject,** *e.g.*, "All men are mortal" "No man is perfect." **A Particular Proposition, on the other hand, is one in which the predicate is affirmed or denied of a part of the subject,** *e.g.*, "Some men are wise", "Some men are not honest."

Marks of Quantity.

The marks of quantity commonly used in Logic —for Universals,—**Any, Every, All, Whatever,** the negative—**No, Not one),** and for Particulars **ome.**

The meaning of "Some" in Logic.

The logical meaning of the word **'Some'** is erent from its popular meaning in two ways :—

'Some' means at least one.

(*i*) Popularly, we use the word to signify a comatively small fraction of the whole. In Logic, vever, the word "Some" means *any indefinite* ntity. Thus, if there are 100 students in a class l only one or two students have prepared their ons, we should, in Logic, say "Some students have pared their lessons.' Again, even if 99 students of 100 have prepared their lessons, in Logic we ıld express this idea also, by saying, "Some students e prepared their lessons". Thus **"Some," in gic, means at least one.**

'Some' means 'Some at least.'

(*ii*) It should further be noted that in using the rd "Some" in Logic, *we leave the question of "All" olutely open.* In ordinary language, when we make atement in respect of some members of a class, we n to imply that the opposite is true in respect of the er members. When, for instance, we say in popular ance, "Some students have prepared their lessons," seem to imply that *"Other students have not pre*ed their lessons." In Logic, however, there is no suggestion or implication. In making a statement erning "Some", nothing is suggested with regard he rest. In popular use, "Some" means "Some ," but **in Logic, "Some" means "Some at t"**—may be all, or may not be all. Thus *in Logic, me" does not necessarily exclude all, but leaves the tion of "All" an open one.*

The Quantity of Categorical Propositions is determined by the Quantity of the Subject.

As to Categorical propositions, the quantity is determined by the quantity of the subject. If the subject is taken in its entire extent, the proposition is Universal, while if the subject is taken in its partial extent, the proposition is Particular. Thus the subject term of a universal proposition is distributed while that of a particular proposition is undistributed.

Indesignate and Predesignate propositons.

In ordinary language, we do not always explicitly state the quantity of a proposition. Where the quantity is not stated explicity and left indefinite, the proposition is called **Indefinite or Indesignate proposition.** *e.g.*, "Man is frail", "Books are useful," etc. ; while propositions whose quantity is expressed are said to be **Predesignate.** Strictly speaking, Indesignate propositions have no place in Logic, because a proposition in Logic must not be vague but should have a precise meaning. From this point of view, in Logic, Indesignate propositions, as a rule, should be treated as Particular.

Note 1. Singular Propositions.

Singular Propositions may be universal or particular according as the subject is a definite singular term or an indefinite singular term.

When the subject of a proposition is a singular term, the proposition is called Singular. Some Logicians recognise this as a third kind of proposition with respect to quantity, distinct from the Universal and the Particular, but this is needless. A Singular proposition should be considered a *Universal* proposition when the subject denotes a *definite* individual or a collection of individuals, *e.g.*, "Plato is a great philosopher," "This man is learned," etc. These propositions are Universal, because the subject terms are taken in their entire denotation and the predicates are affirmed of the whole subject. On the other hand, if the subject of a singular proposition does *not definitely* refer to an individual or a group of individuals, the proposition is *particular*, *e.g.*, "A man is here", "One metal is liquid."

Note 2. Universal Propositions.

We have seen that a Universal Proposition is that in which the predicate is affirmed or denied of the whole subject, or in other words, in a Universal Proposition, the subject is taken in its entire denotation. Now, when the subject is a general term, we express the idea that it is taken in its entire denotation by the use of such words as "all" or "none" ; but if the subject singular term, it is taken in its entire extent when we make lefinite. Thus the following are instances of Universal oositions :—

Universal Affirmative.		*Universal Negative.*
All men are mortal ;	1.	No men are immortal ;
Plato is a philosopher ;	2.	Plato is not a Roman ;
This man is learned.	3.	This man is not foolish.

te 3. Quantity of Hypothetical Propositions.

The quantity of a Hypothetical proposition depends on quantity of its antecedent. A Hypothetical proposition is *versal* when the antecedent is always or in every case owed by the consequent, *e.g.*, "If A is B, C is D," or more icitly, "If, in all cases, A is B, C is D"; on the other hand, ypothetical proposition is *particular*, when the antecedent ollowed by the consequent in some cases or at least in one , *e.g.*, "If, in some cases, A is B, C is D." In the case of ypothetical proposition, if there is no sign of quantity in antecedent, it is taken as Universal.

Quantity of Hypotheticals depends on antecedents.

te 4. Quantity of Disjunctive Propositions.

Disjunctive propositions may be Universal or Particular, "Every S is either P or Q" is Universal ; "Some S is either or Q" is Particular. Particular disjunctive propositions, ever, are practically useless in Logic.

Disjunctive Propositions

. Division according to Modality—Necessary, Assertory and Problematic.

The modality of a proposition consists in the ree of certainty or probability with which the licate is affirmed or denied of the subject. ording to *Modality*, propositions have been divided three classes, *viz.*, Necessary, Assertory and blematic.

Modality= degree of probability.

or Apodi

A proposition is **Necessary,** when the relation ween the subject and the predicate is founded on

Necessary A *must be* B.

1) In distinction from the Apodictic and Problematic propositions, the mere [illegible] proposition is called [illegible]

Assertory. — A *is* B.
Problematic —A *may be* B.

their very nature, *i.e.*, one which is universally and necessarily true; *e.g.*, "A *must be* B," "The three angles of a triangle *must be* equal to two right angles", etc. When the relation between the subject and the predicate is such, that it is established by experience, and true, so far as our experience extends, without implying necessity, the proposition is **Assertory;** *e.g.*, "A *is* B", "All crows *are* black", etc. Lastly, a **Problematic** proposition is one in which the connection between the subject and the predicate is only probable, *i.e.*, true under certain circumstances and not true under others, *e.g.*, "A *may be* B". "He will *probably* come to-morrow", etc.

F. Division of Propositions according to Import: Verbal and Real. 2

In a Verbal proposition the predicate merely states the connotation or a part of the connotation of the subject.

An Analytic or Verbal Proposition is one in which the predicate merely states the connotation or a part of the connotation of the subject, *e.g.*, 'All men are rational'. Here the predicate only brings out explicitly what is implicitly contained in the subject. *Hence an analytic or a verbal proposition conveys no new information.* It is called *Analytic* because it contains merely an analysis of the connotation. Such propositions are also called *Essential or Explicative.*

In a Real proposition the predicate asserts an additional fact not contained in the connotation.

A Synthetic or Real Proposition is one in which the predicate asserts an additional fact which an analysis of the connotation of the subject does not reveal. *A Real proposition conveys some new information* about the subject, not contained in the connotation of the latter. These propositions are also known as *Accidental or Ampliative.* For

2) Analytic propositions are also called Verbal, Essential or Explicative or A Priori. And Synthetic propositions are also known as Real, Accidental or Ampliative or A Posteriori.

nple: Man is a laughing animal, The dog is a estic animal.

The relation of the predicables to this classification of propositions.

In a Verbal proposition, the predicate in rela- to the subject is either a genus or a differentia. example: in the proposition 'All men are animals' predicate is a genus in relation to the subject; while ne proposition 'All men are rational' the predicate differentia in relation to the subject.

In a Real proposition, on the other hand, the licate in relation to the subject is either a pro- im or an accident. For example: 'Man is an lligent animal,' 'Man is a laughing animal,' etc.

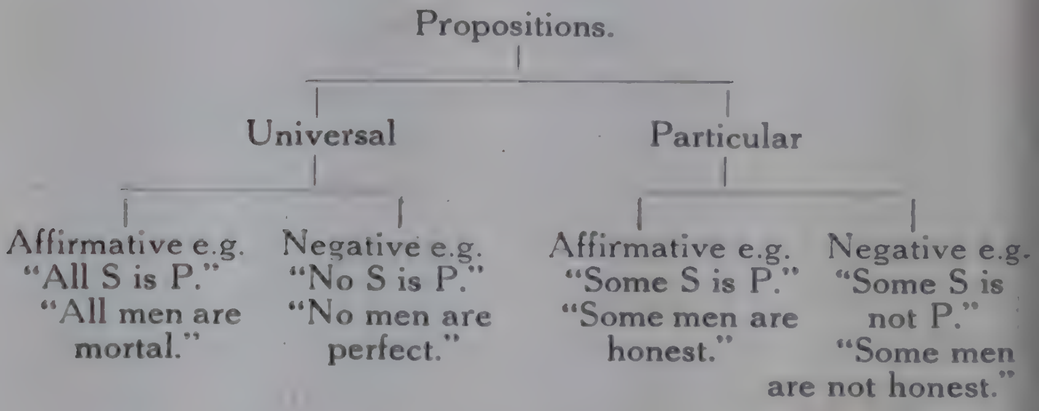
When the predicate in relation to the subject species, the proposition may be either Verbal Real. A species cannot be predicated of a genus, the added attributes of the species cannot belong ll the objects denoted by the genus. Therefore, ecies can only be predicated of an individual. If ndividual be denoted by a *Proper name,* the pro- ion is Synthetic or Real, *e.g.,* Alexander the Great man, Everest is a mountain. We know Proper nes, as such, do not possess any connotation and e the predicates in the above examples convey some information about the subject. If, on the other , the individual is denoted by a *significant singular* and the predicate in relation to the subject is ecies, the proposition is often Verbal. This is ecause significant singular names often contain pecies in their connotation. For examples: 'This Greek conqueror is a man.' 'The highest moun- in the world is a mountain,' are Verbal proposi- because the connotations of the predicates 'man' mountain' are contained in the connotations of the subjects, 'conqueror' and 'the highest mountain,' respectively.

Sec. 3. Simplification of Propositions :

Forms of Propositions, according to Quality and Quantity; A. E. I. O.

Division according to Quantity and Quality combined.

From the point of view of quantity, propositions are divided into Universal and Particular. Both Universal and Particular propositions can be subdivided into Affirmative and Negative, according to their quality. Thus :—


Propositions.
Universal
Particular
Affirmative e.g. "All S is P." "All men are mortal."
Negative e.g. "No S is P." "No men are perfect."
Affirmative e.g. "Some S is P." "Some men are honest."
Negative e.g. "Some S is not P." "Some men are not honest."

A Universal Affirmative proposition is represented by the symbol "**A**"; a Universal Negative proposition by the symbol "**E**"; a Particular Affirmative proposition by the symbol "**I**"; and lastly, a Particular Negative proposition by the symbol "**O**".

Sec. 4. Reduction of Sentences into their Logical form of Propositions.

We have seen that A. E. I. & O. are the four typical forms of propositions recognised in Logic, and if any sentence be not given in strict logical form, it must be reduced to one of these forms, before it can be considered in Logic. We shall now nine some of the irregular forms of sentences, which are in mon use and see how they should be reduced to logical n. It may be pointed out that in doing so, in every case, pay attention to the *meaning of the proposition and not to mere form.*

1. Copula
should be
separately
expressed.

. **Copula.**—In reducing an irregular Sentence to its strict cal form, we must first of all *find out the Copula of the position.* The Copula, as we know, consists of the present e of the verb 'to be,' with or without the negative particle, '. But it often happens that the copula is not separately ressed but mixed up with the main verb, which strictly king, is a part of the predicate of the proposition. In such s, we must bring out the copula and when we do so, the subject and the true predicate are also brought out and it mes easy to determine the quantity and the quality of the position. For example: "All industrious students *deserve* ess" is equivalent to the proposition—"All industrious ents *are* persons who deserve success."

There is another thing to be noted in connection with the ula. We know in Categorical Propositions, the sign of tion is attached to the Copula, except when we have an roposition, the subject of which is a general term, and in h case, the sign of negation is associated with the subject. Ch. VII, Sec. 2 C, p. 109). In the case of those proposi-s, the subjects of which are definite singular terms, the sign egation is attached to the Copula. Hence, if a sentence, h is to be reduced to logical form, contains the sign of tion, the latter should not on any account be attached to predicate. Thus :

(1) The sentence "He does not deserve success", when reduced to logical form, becomes "He *is not* a person who deserves success"—an E proposition, subject of which is a definite singular term.

(2) 'Lazy men do not deserve success' means "No lazy men *are* men who deserve success,"—an E proposition, the subject of which is a general term.

2. The sub-
ject should
be placed

2. Sometimes for the sake of emphasis, particularly in ry, we find the *predicate is placed first.* For example : sentence 'Blessed are the poor,' when reduced to logical

first and then the predicate.

form, should be 'The poor (All poor men) *are* blessed' Similarly, the sentence 'Great was the uproar', when expressed in logical form, should be 'The uproar *is* something which was great'. We should note that Adjectives do not become subjects of propositions.

3. Relative clause qualifying the subject should not be confused with the predicate.

3. The subject may sometimes be mistaken for the predicate when there is a *relative clause qualifying the subject and occurring at the end of a sentence.* For example : 'He jests at scars, who never felt a wound.' In this case, the relative clause 'who never felt a wound,' qualifies 'He'—the subject and when reduced to logical form, the proposition would stand as "All persons who never felt a wound *are* persons who jest at scars." This is an A proposition.

4. All etc. without negation —A.

4. (A) All propositions with **'All' 'Every' 'Each' 'Any** without the sign of negation, are to be treated as A, *i.e.*, Universal affirmative propositions. Examples :—

(*i*) Every man is liable to error—A. All men *are* liable to error.

(*ii*) Each accused person took part in the assault—A. All accused persons *are* persons who took part in the assault.

(*iii*) Any house is a port in the storm—A. All houses *are* ports in the storm.

With negation —O.

(B) Propositions with 'All' 'Every' 'Each' 'Any,' containing the sign of negation 'not' are to be treated as O, i.e., particular negative propositions. For examples:

(*i*) All is not gold that glitters.—O. Some things that glitter *are not* gold.

(*ii*) Every disease is not fatal.—O. Some diseases *are not* fatal.

(*iii*) Any man cannot make a leader.—O. Some men *are not* persons who can make leaders.

5. Most =Some.

5. Propositions with **'Most' 'A few' 'Certain' 'Many' 'Almost all' 'All but one' 'Several'** are to be treated as *particular* negative (O) or affirmative (I) according as, there is or is not, a sign of negation.

ıe word **'Most,'** in its ordinary use, is equivalent to ore than half' but, in Logic, we recognise only niversal and Particular, and hence any indefinite antity should be expressed by 'Some.' Examples:—

(*i*) *Most* of the councillors present voted in favour of the resolution.—I. Some of the councillors present *are* persons who voted in favour of the resolution.

(*ii*) *A few* students are present in the class.—I. Some students *are* present in the class.

(*iii*) *Certain* interested persons are at the bottom of this trouble.—I. Some interested persons *are* at the bottom of this trouble.

(*iv*) *Many* citizens are present at the meeting.—I. Some citizens *are* present at the meeting.

(*v*) *Several* candidates will obtain scholarships.—I. Some candidates *are* those who will obtain scholarships.

6. Propositions containing such words as **'Mostly'** **enerally'** **'Frequently'** **'Often'** **'Perhaps'** **'Nearly Always'** **ometimes'** are to be considered as particular; if there be a n of negation, such propositions should be treated as O prositions; if, on the other hand, there be no sign of negation, propositions should be treated as I propositions. Thus:—

6. Mostly. etc.—particular.

(*i*) White cats with blue eyes are *generally* deaf.—I. Some white cats with blue eyes *are* deaf.

(*ii*) Indian students are not *generally* disrespectful towards their teachers.—O. Some Indian students *are not* disrespectful towards their teachers.

(*iii*) Students *sometimes* commit mistakes.—I. Some students *are* persons who commit mistakes.

(*iv*) Virtuous persons are *often* happy.—I. Some virtuous persons *are* happy.

(*v*) Prophets *mostly* come from the East.—I. Some prophets *are* persons who come from the East.

7. The word **'Few',** in its ordinary use, means *lmost none*' and thus carries with it a negative force. logical equivalent, therefore, is '*Some not.*' Thus sentence beginning with the word 'Few,' and *not ntaining any sign of negation,* is to be treated as an

7. Few= Some not.

O proposition, while a sentence with 'Few,' and *containing a sign of negation*, should be treated as an **I** proposition, two negatives having an affirmative force. Examples:—

(*i*) *Few* men *are* above temptation.—O. Some men *are not* above temptation.

(*ii*) *Few* persons *are not* selfish.—I. Some persons *are* selfish.

8. Seldom etc.—negative.

8. Such words as **'Seldom' 'Hardly' 'Scarcely'** have a negative force and when they occur in propositions, *not containing any sign of negation*, the propositions should be treated as O propositions; on the other hand, when they occur in propositions, *containing a sign of negation*, two negatives possess an affirmative force and hence the propositions should be treated as I propositions. Thus:—

(*i*) People *seldom* realise the difficulties of others.—O. Some people *are not* persons who realise the difficulties of others.

(*ii*) Prosperous businessmen are *not seldom* honest.—I. Some prosperous businessmen *are* honest.

9. Only, Alone, None but.

9. **Exclusive Propositions.** Propositions containing such words as **'Only' 'Alone' 'None but' 'No one else but'** limiting the subject, are called *Exclusive propositions*. These propositions are reduced to logical forms in different ways.

One method of reducing Exclusive Propositions to logical form, is to arrive at an A proposition by inverting the subject and the predicate of the given proposition. For example: The proposition, 'Only matriculates are students of this college,' is equivalent to A.—'All students of this college *are* matriculates.'

We should note in this connection that the meaning of the proposition is not altered. The given proposition does not mean 'All matriculates are students of this college'; obviously those matriculates who joined other colleges and those who did not prosecute their studies further are not students of this ege. But all students who actually joined this college t be matriculates. Thus in reducing an Exclusive proposi- to its logical form, *we invert the subject and the predicate obtain an A proposition.*

Some logicians object to this form of change, because in ucing a proposition to its logical form, the positions of the ject and the predicate should not be changed. In their nion, this is not a mere change of form but a kind of rence known as Conversion. This form, however, is most use.

Another method is to arrive at an E *proposition, by ing the contradictory of the given subject as the subject, he proposition in logical form, the predicate remaining the e.* Thus the proposition 'Only matriculates are students this college' is equivalent to E.—'No non-matriculates *are* dents of this college.'

There is yet a third form, which is an I proposition. ording to this form, the proposition, 'Only matriculates are dents of this college' is equivalent to 'Some matriculates students of this college.' The other two forms being versal are preferred to this particular proposition.

Other examples :—

(*i*) *Only* the virtuous are really happy. This is equivalent to the following forms :—
   (*a*) All really happy men *are* virtuous.—A.
   (*b*) No non-virtuous men *are* really happy.—E.
   (*c*) Some virtuous men *are* really happy.—I.

(*ii*) None but the brave deserves the fair. (Dryden). This is equivalent to the following :—
   (*a*) All persons who deserve the fair *are* brave.—A.
   (*b*) No non-brave persons *are* persons who deserve the fair.—E.
   (*c*) Some brave persons *are* persons who deserve the fair.—I.

(*iii*) The honest *alone* win the confidence of others. This is equivalent to the following :—
   (*a*) All persons who win the confidence of others *are* honest.—A.
   (*b*) No non-honest persons *are* persons who win the confidence of others.—E.

(*c*) Some honest persons *are* persons who win the confidence of others.—I.

10. Definite and Indefinite exceptions.

10. **Exceptive Propositions.** Propositions, in which the predicate is affirmed of the whole subject, with the exception of certain cases, are called Exceptive propositions.

Those Exceptive propositions in which the *exceptions are definitely specified*, are to be treated as *universal*, but those in which *the exceptions are indefinite*, are to be treated as *particular*. For example:—

All metals *except Mercury* are solid.

This is given in logical form and is an A proposition, because the exception being definitely specified, the subject is taken in its entire denotation. But the proposition,

All metals *except one* are solid.

is an I proposition, because the exception is indefinite and the proposition is equivalent to 'Some metals *are* solid.'

11. Singular Propositions.

11. **Singular Propositions.** Singular Propositions, the subjects of which are *definite singular terms*, are Universal, while those whose subjects are *indefinite singular terms*, are Particular. They are affirmative or negative, according as the Copula does or does not contain the sign of negation. Thus:—

(*i*) Alexander the Great was a great conqueror. This is an A proposition.

(*ii*) Alexander the Great was not a Roman. This is an E proposition.

(*iii*) A Greek conquered India. This is equivalent to 'Some Greek conquered India,—an I proposition.

(*iv*) One metal is not solid. This is equivalent to 'Some metal is not solid'—an O proposition.

12. Interrogative Sentences.

12. **Interrogative Sentences.** Sometimes, terrogative sentences clearly suggest their own swers and in such cases they can be easily reduced a logical form. For examples:—

'Breathes there the man with soul so dead?' (Sir Walter ott). This obviously means that no such persons exist. ierefore the logical form is 'No men with soul so dead *are* rsons who breathe.' Similarly, "Who is here so base that uld be a bondsman?" "Who is here so rude that would t be a Roman?" (*Shakespeare—Julius Cæsar*) obviously ply that no such persons were in existence.

In conclusion, it may be pointed out that it is not ssible to formulate rules for reducing all the infinite rieties of irregular sentences into logical form, but is sufficient to state that *in reducing to logical form, e meaning of the given proposition must remain bstantially unaltered.*

ec. 5. Distribution of Terms.

A Term is said to be distributed, when it is ken in its entire denotation and it is undistri- ted, when only a part of its denotation is taken into nsideration. Thus by the distribution of a term, we ean '*taking it universally or referring to all parts it.*'

Let us now examine the fourfold classification of pro- sitions into A.E.I.O. and determine which terms are distri- ted in them.

'A' distributes Subject only.

An A proposition, or a Universal Affirmative proposition, of the form: All S is P; All men are mortal. In this e it is quite clear that the subject term is taken in its entire ent, *i.e.*, distributed, while there is no explicit reference to full denotation of the predicate. Thus, *in an A Proposition, subject is distributed but the predicate is undistributed.*

'E' distributes both subject and predicate.

An E proposition, or a Universal Negative proposition, is the form—No S is P; No men are perfect. In this case, h the subject and the predicate are taken in their entire extent and the proposition means that the classes denoted by the subject and the predicate respectively are mutually exclusive. Thus, in the concrete example given above, the classes "man" and "perfect being," absolutely exclude each other and both are taken distributively. Thus, *in an E proposition, both the subject and the predicate are distributed.*

'I' does not distribute any term.

An I proposition, or Particular Affirmative proposition, is of the form—Some S is P ; Some men are intelligent. In this case, the subject is clearly understood in its partial extent and so far as the predicate is concerned, we find its quantity is not explicitly stated. Thus, *in an I proposition, neither the subject nor the predicate is distributed.*

'O' distributes Predicate only.

Lastly, an O proposition, or a Particular Negative proposition, is of the form : Some S is not P ; Some men are not honest. In this case, the subject is clearly undistributed. When, however, we look at the predicate, we find it is distributed. A negative proposition means that the predicate is denied of the subject. The predicate may be denied of the entire subject, as in an E proposition or of a part of the subject, as in an O proposition, but, in both cases, so far as the predicate is concerned, it must be denied in its entirety, otherwise denial or negation does not possess any meaning. Thus, *in an O proposition the subject is undistributed but the predicate is distributed.*

We may sum up the results as follows:—

Universal propositions (A & E) distribute their subjects, but Particular propositions, (I & O) do not distribute their subjects.

Negative propositions (E & O) distribute their predicates, but affirmative propositions (A & I) do not distribute their predicates.

Hence A distributes Subject only.
E ,, both Subject and Predicate.
I ,, neither Subject nor Predicate.
O ,, Predicate only.

Note. Quantification of the Predicate.

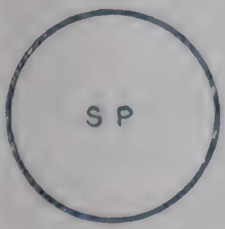
It may be observed that in the above propositions only the quantity of the subject is explicitly stated but not the ntity of the predicate. There are some logicians, (*e.g.*, **milton)** who explicitly quantify the predicate as well and ognise the following eight forms of propositions according quantity thus :—

U. Toto-total affirmative.—All S is all P.
A. Toto-partial affirmative.—All S is some P.
Y. Parti-total affirmative.—Some S is all P.
I. Parti-partial affirmative.—Some S is some P.
E. Toto-total negative.—No S is any P.
η. Toto-partial negative.—No S is some P.
O. Parti-total negative.—Some S is not any P.
ω. Parti-partial negative.—Some S is not some P.

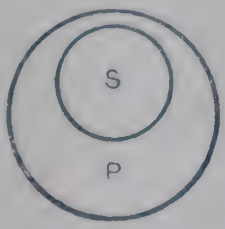
This doctrine of the quantification of the predicate is vever not generally accepted, on the ground that it is needly cumbrous.

c. 6. Representations of the four kinds of Propositions by means of Diagrams : Euler's Circles.

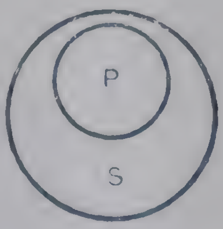
Euler, a distinguished Swiss logician of the hteenth century, formulated a scheme of diagrams presenting the four kinds of propositions. In his eme, he represented the relations between the bject and the predicate terms, understood in denoion, by means of circles thus :—



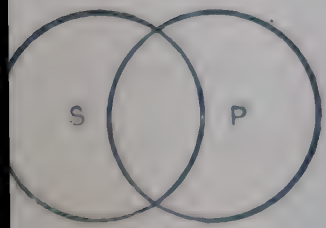
I.



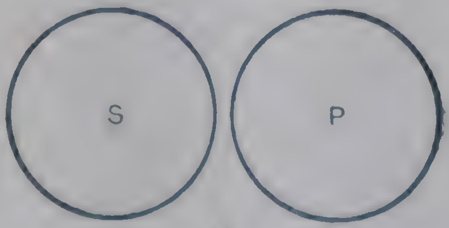
II.



III.



IV.



V.

In this scheme, S stands as the subject and P stands as the predicate, and both the terms are taken in their denotation. Let us see how the fourfold classification of propositions fits in with this scheme:—

A
(I & II)

An A proposition is represented by the circles I and II. The proposition 'All S is P' may sometimes mean that the denotation of S is the same as the denotation of P, as represented by the circle I; or that the denotation of the term S is included in that of P, as represented by the circle II.

E
(V)

An E proposition is represented by the circle V. The proposition 'No S is P' means that the circles represented by S and P are absolutely outside each other.

I
(I, II, III, IV)

An I proposition is represented by the circles I, II, III and IV. We know, in Logic, the term 'Some,' leaves the question of 'All' an open one. Hence the proposition, 'Some S is P,' may be represented by circle I, in which 'All S is all P'; by circle II, in which 'All S is some P'; by circle III, in which 'Some S is all P'; and lastly, by circle IV, in which 'Some S is some P.'

O
(III, IV, V)

An O proposition is represented by the circles III, IV and V. Circle III represents 'Some S is not any P;' Circle IV represents 'Some S is not some P;' and lastly, Circle V represents 'No S is any P.' O may be represented by all these diagrams, because, in Logic, 'Some' does not necessarily exclude 'All.'

Hints for Working Out Exercises.

In reducing an irregular proposition to its logical form, the first step is to *find out the Copula.* The Copula should be of the present tense of the verb 'to be' with or without 'not.'

The next step is to determine the correct *quantity.* his chapter, we have considered the usual forms in which ositions are found in ordinary language and how we should rtain their quantity.

Lastly, we have to assign the true mark of *quality.* In case of the categorical propositions, the quality is deter- ed by the quality of the Copula, except in the case of E ositions with general terms as subjects in which the sign egation is placed before the subject.

It should be noticed that the infinite variety of expres- s, used in language, makes for perspecuity, beauty and efulness, in the form of expression. In Logic, however, infinity of forms must be simplified into four kinds of ositions. It is thus natural that language loses much of harm, when logical forms are employed. The advantages implification are counterbalanced by loss of perspecuity beauty of expression. This may be explained by means n analogy. In ancient Greece, there was a robber named rustes, whose favourite pastime was to get hold of victims force them to lie on a bed. No victim exactly d into the bed. Thus if the victim was too long for the the robber lopped off the head of the victims to make fit into the bed. If the victim was too short, the robber ld lengthen out the body of the victim, so that in any the victim died. The four typical forms of logical ositions may be compared to the bed of the robber, rustes. The infinite variety of expressions, ordinarily in language, must be squeezed into the Procrustean bed gical forms, before they can be considered in Logic. No der that the logical propositions are so bald and un- esting. In the process of violent transformation, all fine shades of meanings are lost, though the substantial ing may be retained.

Exercises Worked Out.

1. *What do you consider to be the quantities of the wing propositions and why?*

(*i*) *There is no man that is not naturally good.*

This is an A proposition and is equivalent to 'All men *are* rally good' because two negatives have an affirmative force.

(*ii*) *Many men were drowned, in attempting to cross the river.*

This is an I proposition and is equivalent to 'Some men hose who were drowned in attempting to cross the river.'

(iii) All but a few were taken prisoners.

This is an I proposition because, the exceptions are no definitely specified. The proposition is equivalent to 'Som persons *are* those who were taken prisoners.'

(iv) Anybody can do that.

This means 'All men *are* men who can do that'—A proposition.

2. *Express the following propositions, in their simples logical form stating the quality and the quantity of each :—*

(a) The Earth is the only planet that has ar atmosphere.

This is in logical form, the proposition being an A proposition. It may be noted that here, both the subject anc the predicate are distributed.

(b) Not to go on is to go back.

This proposition is in logical form, being an E proposition.

(c) When beggars die, there are no comets seen.

This is a hypothetical proposition and is equivalent tc 'If beggars die, no comets are seen.' This is an E proposition because the quantity of a hypothetical proposition is determined by the quantity of the antecedent, and the quality depends on the quality of its consequent.

(d) All swans are not white.

This is an O proposition, meaning 'Some swans *are not* white.'

3. *Express the following judgments, in their simplest logical forms marking their quantity and quality :—*

(i) Every term has not a connotation.

This is an O proposition, and is equivalent to 'Some terms *are not* those which have connotation.'

(ii) Only ignorant people believe in witchcraft.

This is an Exclusive proposition and is equivalent to the following three forms :—

A. All persons who believe in witchcraft *are* ignorant.

E. No non-ignorant persons *are* those who believe in witchcraft.

I. Some ignorant persons *are* those who believe in witchcraft.

(iii) The conclusions must follow the weakest parts.

This is equivalent to 'All conclusions *are* such as must follow the weakest parts' and is thus an A proposition.

4. *Give the quantity and quality of each of the follow- propositions and reduce each to its logical form :—*

(*a*) *None thinks the fools great, but the fools them- es.*

This is an Exclusive Proposition and is equivalent to the wing three propositions :—

A. All persons, who think the fools great, *are* fools themselves.
E. No non-fools *are* persons who think the fools great.
I. Some persons who are themselves fools *are* persons who think the fools great.

(*b*) *Things are not what they seem.*

This is equivalent to 'Some things *are not* what they ' and is thus an O proposition.

(*c*) *One of you at least should be able to answer this question.*

This is an I proposition and is equivalent to "Some of at least *is* a person who should be able to answer this tion."

5. *Point out the quality and quantity of each of the wing propositions :—*

(*a*) *Only ignorant persons hold such opinions.*

This Exclusive proposition is equivalent to the following logical forms :—

A. All persons who hold such opinions *are* ignorant.
E. No non-ignorant persons *are* persons who hold such opinions.
I. Some ignorant persons *are* persons who hold such opinions.

(*b*) *Few persons are proof against temptations.*

This is an O proposition, and is equivalent to "Some ns *are not* proof against temptations." 'Few' means 'Some

(*c*) *Phosphorus does not dissolve in water.*

This is equivalent to the proposition 'Phosphorus *is not* stance which dissolves in water', an E proposition.

(*d*) *Many are deserving persons, who are unfortunate.*

This is an I proposition and is equivalent to 'Some who nfortunate *are* deserving men.'

. *Reduce the following propositions to their logical indicating their quality and quantity :—*

(*i*) *The critical spirit is not infrequently the fault-finding spirit.*

This is equivalent to 'Some cases of critical spirit *are* of fault-finding spirit' and is thus an I proposition, se, two negatives have an affirmative force.

(*ii*) *Not all are friends who profess to be so.*

This is an O proposition and is equivalent to 'Some ns who profess to be friends *are not* friends.'

7. *State which terms are distributed in the followi propositions :—*

(*i*) *Some of the valuable books are seldom read.*

This is equivalent to "Some of the valuable books *are n* read", an O proposition and thus the subject is not distribute but the predicate is distributed.

(*ii*) ***Every mistake is not culpable.***

This is equivalent to 'Some mistakes *are not* culpable an O proposition distributing its predicate, but not its subjec

8. *Put each of the following propositions in exact logic form :—*

(*a*) ***All lawyers are not knaves.***

This is equivalent to O, 'Some lawyers *are not* knaves.'

(*b*) ***None but graduates are eligible.***

This is an Exclusive Proposition and is equivalent to th following logical forms :—

A. All persons who are eligible *are* graduates.
E. No non-graduates *are* eligible.
I. Some graduates *are* eligible.

(*c*) *All but he (Casabianca) had fled from the burnin deck.*

This is an Exceptive proposition and the exception 'Casabianca,' has been definitely specified. Hence it is an A proposition and stated in strict logical form, it stands a follows :—

A. All but he (Casabianca) *are* persons who had fle from the burning deck.

9. *Reduce the following irregular sentences into logica form :—*

(*a*) ***They say he is bankrupt.***

ANSWER.—The expression "they say" means 'people in general say.' Hence this should be reduced to the following I proposition—Some people *are* those who say that he is bankrupt.

(*b*) It rains.

ANSWER.—The pronoun 'It' here is used for "the weather." Hence this is equivalent to the following A proposition—The weather *is* rainy.

Exercise VII.

1. Distinguish carefully between a Judgment, a Pro-position and a Sentence. What are the different ways of classifying Propositions? Explain and exemplify each class.

2. What are the various ways of classifying Proposi-tions? Explain and exemplify each class. What do you consider to be the precise significance of a disjunctive pro-position and why? What do you know regarding the quantity of propositions and how?

3. Classify propositions according to Quantity and Quality l illustrate them by appropriate diagrams.

4. Distinguish between a term and a proposition.

5. What is meant by a Proposition in Logic ? What its parts, and how are the parts related to each other ? te whether the following propositions are Universal or ticular :

(*a*) A burnt child dreads the fire ;
(*b*) All our mistakes are not borne out by ourselves.
(*c*) Hardly any nation is free from economic distress.
(*d*) There is at least one student who is not present.
(*e*) Most storms are preceded by a fall of the barometer.

6. Give and explain the diagrammatic representations the propositions A, E, I and O. State the general rules arding distribution of terms in propositions.

7. State the general rules relating to the distribution terms in propositions. Point out the terms which are listributed in the following propositions :—

(*a*) Books are generally useful.
(*b*) The Earth moves round the Sun.

8. State the quality and quantity of the following positions :—

(*a*) Only the educated are fit to vote.
(*b*) A few drops of rain are not of much consequence.
(*c*) Man proposes, God disposes.
(*d*) A few men will not suffice to move this table.

9. What is meant by Distribution of terms in a egorical Proposition ? Show that the distribution of the licate depends upon the quality of the proposition.

10. Distinguish between Property and Accident in the cal senses of these words, giving examples of each ; and ly this distinction to explain the difference between lytical and Synthetical Propositions.

11. Explain the difference between a Verbal and a Real position, giving examples. 'Whatever is affirmed or ed of a class, is affirmed or denied of every member of class.' Is this a Verbal or a Real Proposition ?

12. Have the Predicables anything to do with the dis- ion between Real and Verbal Propositions ?

13. Why are Singular Propositions Universal ? Bring out ly the ambiguities attaching to the words 'Some,' 'Any,' 'Few,' 'Many,' 'Most.'

14. Reduce the following proposition to its logical , pointing out the terms which are distributed in it :—

No lover is he who is not always fond.

15. Explain and illustrate the following kinds of Pro- ions :—(*a*) Hypothetical, (*b*) Disjunctive, (*c*) Exclusive,

(*d*) Exceptive, (*e*) Analytic and Synthetic, (*f*) Indesignate, (*g*) Necessary and Assertory.

16. Express the following in strict logical forms adding the symbols, A, E, I or O in each case :—

(*a*) All good writers are not good speakers.
(*b*) He must work who wants to succeed.
(*c*) All but the best student in the class got plucked in the examination.
(*d*) Only slates are used for writing in this school.
(*e*) Few men are indifferent to danger.
(*f*) Nearly everybody in the town suffered from the epidemic outbreak.
(*g*) Children alone are admitted free to the show.
(*h*) All who praise are not friends.
(*i*) Any answer is not a good answer.
(*j*) Few men really take full responsibility for all their actions.
(*k*) All men sometimes fall into error.
(*l*) Any student will answer this simple question.
(*m*) Stony walls do not a prison make.
(*n*) Only philosophers find difficulty in the matter.
(*o*) All my answers except one were correct.
(*p*) Few men have not suffered sorrows.
(*q*) Only a handful of men become famous.

17. Discuss the forms and character of Conditional judgments.

18. Classify propositions according to relation and according to modality.

19. What is the modality of a hypothetical proposition ?

CHAPTER VIII.

IMPORT OF CATEGORICAL PROPOSITIONS AND THEORIES OF PREDICATION.

c. 1. Theories of Predication.
c. 2. The Nominalist, the Conceptualist, and the Realist theories of the Import of Propositions.
Exercise VIII.

The question here is—What is the true nature of edication? In other words, what exactly do we when we make a predication? To these questions fferent answers have been given by logicians. In is connection there are two problems to be considered d in both cases, there is a controversy amongst gicians. The first problem is: What kind of relation tween the subject and the predicate does the prosition express? and secondly, to what does the oposition as a whole primarily refer—to real things, names or to ideas? Let us deal with these problems some length.

ec. 1. Theories of Predication.

The question here is—What is the meaning of e Subject? What is the meaning of the Predicate? nd what is the meaning of the relation between the bject and the predicate of a logical proposition?

Logicians have differed widely in their views with gard to these questions and these different views nstitute the different theories of Predication.

The Ordinary view or the Predicative view.

According to the Predicative view or the ordinary mmon-sense view, *the subject of a proposition is to taken in its denotation, the predicate, in its con-*

I
Predicative
view :
Subject in

denotation and predicate in connotation.

notation and the meaning of the proposition is that the attribute connoted by the predicate is either affirmed or denied of the things or individuals denoted by the subject. For example: the proposition 'All men are mortal' means the attribute 'Mortality' is possessed by 'All men.' Similarly, 'No man is perfect' means the attribute 'perfection' is denied of 'all men.' This view is held by **Martineau** and **Venn.**

II. The Denotative view.

II Denotative view : Both subject and predicate in denotation.

According to the Denotative view, *both the subject and the predicate are to be understood in their denotation* and the meaning of a proposition is that the class denoted by the subject is either included in or excluded from the class denoted by the predicate. For example: according to this view, the proposition 'All men are mortal' means the class 'Man' is included in the class 'Mortal beings'; the proposition 'No man is perfect' means the class 'Man' is excluded from the class 'Perfect beings.'

III. The Connotative or Attributive view.

III Connotative view : Both subject and predicate in connotation.

According to the Connotative view, *both the subject and the predicate are to be taken in their connotation* and the purpose of a proposition is to express a certain relation between the attributes connoted by the subject and the predicate. From this point of view, the proposition 'All men are mortal' would mean that the attribute 'Mortality' accompanies the attribute 'Humanity,' while the proposition 'No men are perfect' would mean that the attribute 'Perfection' is excluded from the attribute 'Humanity'. This view is advocated by **Mill.**

The Denotative-Connotative view.

IV
Denotative-Connotative view : subject and predicate either in denotation or in connotation.

This view is a combination of the second and l views. According to the Denotative-Connotative , the subject and the predicate of a proposition be understood either in denotation or in con- tion. When both of them are understood in their otation, the subject is included in or excluded from predicate, while when both of them are understood heir connotation, the predicate is included in or uded from the subject. This is no new theory a mere combination of the Denotative and Con- tive views of Predication. This view is held **Hamilton.**

. 2. The Nominalist, the Conceptualist and the Realist theories of the Import of Propositions.

The problem here is—What does the proposition as a e primarily refer to? On this point *three* views have held, *viz.*, it refers to *names*, *ideas*, and *real things*. Let riefly mention these views :—

(*i*) *The Nominalist view.*

This is the view of **Hobbes.** According to this view, the osition expresses a relation between two names. Hobbes s that the import of the proposition is the belief of the ker that the predicate is the name of the same thing of h the subject is a name.

This view is unsatisfactory, because it implies that truth erely formal, that truth consists in mere verbal consistency, eas. truth is not merely formal but also material.

(*ii*) *The Conceptualist view.*

According to this view held by **Locke,** a proposition states lation between two concepts or ideas, *i.e.*, a proposition s an agreement or disagreement between two ideas.

This view is unsatisfactory in so far as it fails to recognise that an idea must be an *idea of something;* that there are no such things as mere ideas, and therefore, a proposition cannot refer to ideas alone.

(*iii*) *The Realist view.*

According to this view, a proposition refers to things, and not to ideas or names.

The correct view appears to be a combination of the Conceptualist and the Realist views. This is the view of **Bradley.** It is true that a proposition involves an idea or concept but this idea refers to an objective reality. Hence a proposition not only refers to an idea but also to the thing of which we have the idea.

Exercise VIII.

1. State clearly the meaning of the expression 'the Import of Propositions' and state the principal views, advanced by logicians regarding Import. What precisely does the proposition "All men are mortal" mean according to each of these views?

2. Give the Predicative and Denotative views of the Import of propositions and illustrate each by an example. What do you think to be the correct view of the Import of propositions and why?

3. What do you understand by the Theory of Predication? Explain and illustrate the different theories by reference to a concrete example.

4. State briefly the main theories of the import of propositions, and discuss fully any *one* of them.

CHAPTER IX.

Opposition of Propositions.

1. Different forms of Opposition.
    - A. Subalternation. Note. Is Subalternation is a form of Opposition ?
    - B. Contrariety.
    - C. Sub-Contrariety.
    - D. Contradictory Opposition.
2. The Square of Opposition.
    Exercise IX.

1. Different forms of Opposition.

What is Opposition ?

By "Opposition of Propositions" is meant, the tion which obtains between two propositions ing the same subject and the same predicate differing in quantity only, or in quality only, or in quantity and in quality. There are four s of Opposition, *viz.*, Subalternation (or Subaltern osition), Contrariety (or Contrary Opposition), -contrariety (or Sub-contrary Opposition) and y, Contradictory Opposition.

Four forms of Opposition.

Subalternation.

Subalternation—difference in quantity only.

Subalternation or Subaltern Opposition is the tion which exists between two propositions ng the same subject and the same predicate having the same quality but differing in ntity only. Thus, it is the relation which exists een a universal proposition and its corresponding cular of the same quality, *i.e.* to say, between A I ; and E and O. In such a pair of opposites, the ersal proposition is called *Subalternant* and the cular proposition is called *Subalternate*.

For example: the propositions 'All men are imperfect' and 'Some men are imperfect', and the propositions 'No man is immortal' and 'Some men are not immortal' are opposed to each other by way of Subalternation.

Imp

Note. Is Subalternation a form of Opposition?

Whether Subalternation is a form of Opposition or not depends on the meaning of the word 'Opposition.'

The word "Opposition" in its popular significance, implies an element of contradiction and popularly speaking, only such propositions are opposed to each other as cannot both be true. From this point of view, Subalternation cannot be regarded as a form of Opposition, because in Subalternation. not only are the two propositions not inconsistent with each other but the truth of the universal proposition necessarily involves the truth of the particular proposition. Thus 'All men are mortal' and 'Some men are mortal' are both true and the universal proposition involves the truth of the particular. In Subalternation, there is no opposition of quality but only a difference in quantity between the two propositions. *

The word "Opposition" however is generally used by logicians in a special sense, to include also mere quantitative differences, without any opposition of quality. It is quite clear that when used in this special sense, Subalternation must be regarded as a form of Opposition. Thus whether Subalternation is a form of Opposition or not, depends on the meaning of the word "Opposition."

B. Contrariety or Contrary Opposition.

Contrary Opposition—two universal propositions differing in quality only.

Contrary Opposition is the relation between two universal propositions, which have the same subject and the same predicate but which differ in quality, *i.e.*, to say, between an A and its corresponding E proposition. The relation between the propositions nen are imperfect' and 'No man is imperfect' is f Contrary Opposition.

---

* Further, if we hold that two propositions cannot be said to be opposed to each other when they can both be true, *Sub-contrary Opposition also*, as we shall see in Sec. 2, cannot be regarded as a form of Opposition.

ub-contrariety or Sub-contrary Opposition.

ub-contrary Opposition is the relation between particular propositions, which have the same ct and the same predicate but which differ in ty, *i.e.* to say, between an I proposition and its sponding O proposition. For example, the on between the propositions 'Some men are igent' and 'Some men are not intelligent', is f Sub-contrary Opposition.

Sub-contrary Opposition—two particular propositions differing in quality only.

ontradictory Opposition.

ontradictory Opposition is the relation een the propositions which have the same ct and the same predicate but which differ in quantity and in quality. There are two of contradictories, *viz.*, A and O; E and I.

Contradictory opposition—two propositions differing in quantity and quality both.

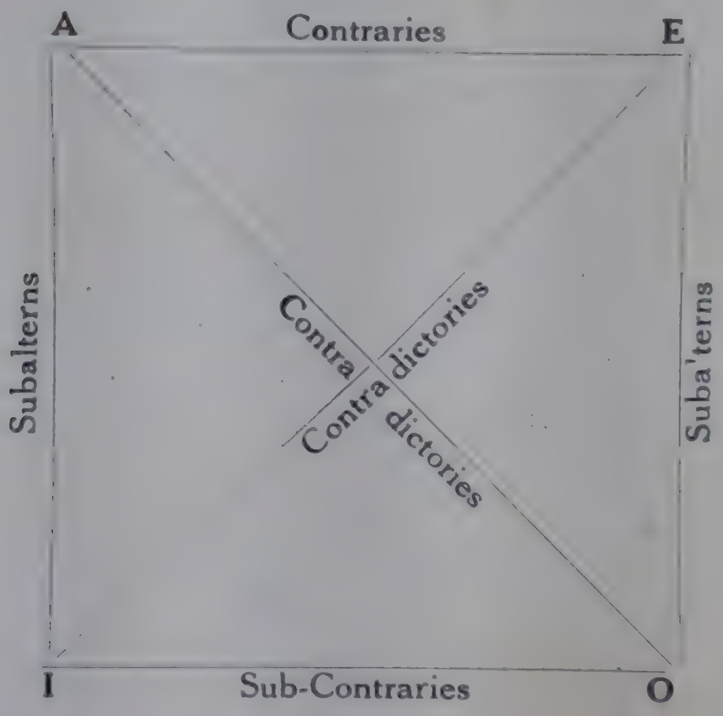
ontradictory Opposition is the *perfect form of sition*, because in it, there is difference both in ity and in quality. The contradictory of A, *i.e.*, rsal affirmative is O, *i.e.*, Particular negative; the contradictory of E, *i.e.*, Universal negative *e.*, Particular affirmative.

o sum up; The word 'Opposition' has been used ider and a narrower sense. In the wider sense, are four kinds of Opposition including Subation. In the narrower sense there are only three of Opposition, *viz.*, Contrary, Sub-contrary and adictory Opposition.

he relation of Opposition can exist only between ropositions having the same subject and the same predicate. In Subalternation, there is only a difference in quantity; in Contrary Opposition, two universal propositions differ in quality; in Subcontrary Opposition, two particular propositions differ in quality; and lastly in Contradictory Opposition, there is difference both in quality and in quantity. A & I and E & O are Subalterns; A & E are Contraries; I & O are Sub-contraries and lastly, A & O and E & I are Contradictories.

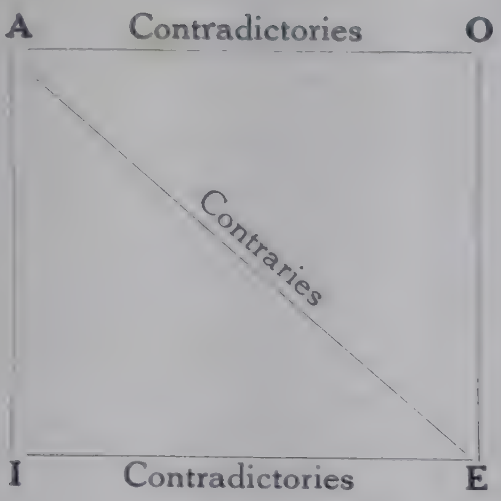
Sec. 2. The Square of Opposition.

The Square of Opposition, which is a diagram, as an aid to remembering the doctrine of Opposition of Propositions, stands as follows:—


A
Contraries
E
Subalterns
Contra
dictories
Contra
dictories
Suba'terns
I
Sub-Contraries
O

In this diagram, the universal propositions are placed at the top, the particular propositions are placed at the bottom, the affirmative propositions on the left and the negative propositions on the right.

istotle gives the following representation of the Square osition :—



s distinguished from the Square given before, the Square stotle presents the following features :—

) *Subalternation is not recognised as a form of tion.*

) *Sub-contrary Opposition is not recognised* because, mes an I proposition and an O proposition may both be *e.g.*, the propositions 'Some men are honest' and 'Some e not honest' are both true. Thus according to Artistotle, tion necessarily means that both the propositions cannot e at the same time.

) Aristotle only recognises *Contrary* and *Contradictory tion.* In Aristotle's Square, Contrary Opposition is nted by the diagonal line and Contradictory Opposition lines by sides of the Square.

Exercise IX.

What do you understand by the Opposition of Pro- ns ? What propositions can be inferred as true, false or ul, if the following proposition is false :—

Some happy men are discontented.

All is not gold that glitters. What inferences follow e various kinds of Opposition from the truth of the above proposition ? Is Subalternation a kind of Opposition ? Draw the Square of Opposition to illustrate your answer.

3. Draw the common Square of Opposition and explain it. How does it differ from Aristotle's Square of Opposition ?

4. Assuming the proposition 'Some students of Logic do not know Logic' to be false, what do you know about the truth or falsity of its opposities ?

5. What is meant by the Opposition of Propositions ? Explain the different forms of Opposition indicating their uses in the practical affairs of life.

6. What is meant by the logical Opposition of Propositions ? Is Subalternation a form of Opposition ? What is the rule of inference in the case of (A) Contrary Opposition, (B) Sub-contrary Opposition ?

7. Construct the diagram of the Opposition of Propositions.

8. State the logical relation to each other of the following propositions :—

(*a*) Good men are wise.
(*b*) Unwise men are not good.
(*c*) Some unwise men are good.
(*d*) No good men are unwise.

Immediate Inference = Eduction.

CHAPTER X.

IMMEDIATE INFERENCE. =

1. Inference in general: Deductive and Inductive: Immediate and Mediate: Is Immediate Inference inference at all?
2. Conversion.
   Note 1. Can an A proposition be converted simply?
   Note 2. Conversion by Negation.
   Note 3. Inference by Converse Relation.
3. Obversion.
   Note. Material Obversion.
4. Contraposition.
   Note 1. Contraposition is a compound form of Immediate Inference.
   Note 2. Contrapositive is different from Obverted Converse.
5. Inversion.
   Note. Table of comparison of the principal forms of Immediate Inference.
6. Opposition.
7. Modal Consequence.
8. Change of Relation.
9. Inference by Added Determinants.
10. Inference by Complex Conception.
    Exercise X.

1. Inference in general: Deductive and Inductive: Immediate and Mediate.

Inference or **Reasoning** is the *process* of passing one or more propositions to another, which is fied by them; and the *product* is called an infer- or a reasoning. An Inference, thus, requires more one proposition and when expressed in language, lled an **Argument.** Thus, an Argument consists ore than one proposition.

An Inference when expressed in language is called an Argument.

In an Argument we have Premise and Conclusion.

In an Argument, we thus proceed from one or more propositions which are given to another proposition. The proposition or propositions, which are given, are called the **Premise,** and the proposition, which is drawn from them, is called the **Conclusion.** Thus, in Inference or Argument, from certain given statements, we pass on to a certain other statement which is new to us, though the new statement follows from the given premise or premises necessarily.

Inferences are Deductive or Inductive.

Inferences have been broadly divided into Deductive and Inductive. In **Deductive Inference,** the conclusion cannot be more general than the data, while in **Inductive Inference,** the conclusion must be more general than the data.

Deductive Inferences are sub-divided into Immediate and Mediate, acording as there is only one premise or more than one premise.

Deductive Inferences, again, have been subdivided into *Immediate* and *Mediate.*

Immediate Inference is a kind of deductive inference, in which, the conclusion follows from only one premise. In Immediate Inference, the meaning of a single proposition is unfolded. Being a sub-division of deductive inference, the conclusion cannot be more general than the data. In **Mediate Inference,** on the other hand, **the conclusion follows from more than one proposition.** Where there are only two premises and the conclusion follows from them taken jointly, the form of mediate inference is called a Syllogism.

Imp

Is Immediate Inference, an inference at all ?

Is Immediate Inference an inference at all?

There are some logicians, *e.g.*, Mill, Bain, etc., who go the length of saying that Immediate Inferences are not inferences at all. **Mill** calls them, "*Inferences* *roperly so-called.*” As Mill says: “In all these es there is not really an inference; there is in the nclusion no new truth, nothing but what was already erted in the premises................The fact asserted the conclusion is either the very same fact, or part the fact, asserted in the original proposition.” **in** says: “In none of these cases, is there inference pperly so-called, that is to say, the transition from a t to some different fact. There is merely the *nsition from one wording to another wording of the ne fact.*” To take an example from Obversion. e proposition ‘All men are mortal’ when obverted es ‘No men are non-mortal.’ It is clear that the verse is a mere variation of the premise.

It is true that in Immediate Inference, the step om the premise to the conclusion is a small one, but l it is not correct to say that it is no step at all. Its ef function is to bring out the full implications of a en proposition, by *making explicit what was impli-ly contained in the premise.* The original proposi-n may be known, but its full implications may not known. From this standpoint, Immediate Inference tainly leads to something new and unknown, m something which is given and known.

Immediate Inference may be of various kinds, viz., *Con-sion, Obversion, Contraposition, Inversion* (Partial and nplete). *Opposition, Modal Consequence, Change of Relation, rence by Added Determinants* and *Inference by Complex ception.* Of these the first four forms, viz., *Conversion, version, Contraposition* and *Inversion* are called *Eductions.* **uctions** *may be defined as those forms of Immediate rence in which from a given proposition, accepted as true, derive others implied in it, though differing from it in subject predicate or both.* We shall deal with each class separately.

Various forms.

Sec. 2. Conversion.

Definition of Conversion.

Conversion is a form of Immediate Inference in which there is a legitimate transposition of the subject and the predicate of a proposition.

The given proposition which is to be converted is called the **Convertend;** and the proposition, which is inferred from the given proposition, is called the **Converse.**

Rules of Conversion.

In Conversion, the following **Rules** have to be observed:

(*i*) The *subject* of the Convertend becomes the predicate of the Converse;

(*ii*) The *predicate* of the Convertend becomes the subject of the Converse;

(*iii*) The *quality* of the Converse is the same as that of the Convertend, *i.e.*, to say, if the Convertend be affirmative, the Converse is affirmative, and if the Convertend be negative, the Converse is negative;

(*iv*) No term can be *distributed* in the Converse, unless it is distributed in the Convertend.

Let us now apply these rules in converting the four typical kinds of propositions:

A—I

(*i*) **Conversion of A.** *The Converse of an A proposition is an I proposition.* According to the rules of Conversion, the Converse must have the same quality; therefore, the Converse of A must be an affirmative proposition, *i.e.*, either A or I. Now, the Converse of A cannot be an A proposition, because in that case, the predicate of the Convertend which is undistributed in it will be distributed in the Converse. Therefore the Converse must be I. Thus:

Convertend :	All S is P.	All men are mortal.
∴ Converse :	Some P is S.	Some mortals are men.

E—E

(*ii*) **Conversion of E.** *The Converse of an E proposition is an E proposition.* An E proposition is negative, ierefore, its Converse must be negative. If we draw an proposition from an E proposition, by Conversion, there no violation of the rule regarding distribution of terms, ecause, in the Convertend both the subject and the predicate e distributed and they may therefore be distributed in the onverse. Thus :

Convertend : No S is P. No man is perfect.
∴ Converse : No P is S. No perfect beings are men.

I—I

(*iii*) **Conversion of I.** *The Converse of an I proosition is an I proposition.* An I proposition being affirmave, its Converse must be affirmative and as an I proposition oes not distribute either the subject or the predicate, neither them can be distributed in the conclusion. Hence an I oposition has for its Converse an I proposition. Thus :

Convertend : Some S is P. Some men are intelligent.
. Converse : Some P is S. Some intelligent beings are men.

O—x

Simple

(*iv*) **Conversion of O. An O proposition cannot be nverted.** An O proposition being negative, its Converse, if y, must be negative and as such the predicate would be stributed in the Converse. The predicate of the Converse, wever, cannot be distributed, because it, being the subject the Convertend, is undistributed. Hence if the Convertend O, no conclusion follows.

To sum up: **By Conversion, A gives I; E ves E; I gives I; but O does not yield any nclusion.**

Two kinds of Conversion.

Conversion has two forms, *viz.*, Simple Convern and Conversion *per accidens* (or Conversion by itation). In **Simple Conversion,** the quantity of Converse is the same as the quantity of the Conrtend, *i.e.*, to say, if the Convertend be universal, the nverse also is universal; and if the Convertend be rticular, the Converse is also particular. Thus E positions and I propositions are converted simply. the other hand, in **Conversion per accidens,** the quantity of the Converse is different from the quantity of the Convertend, *i.e.*, the Convertend is universal but the Converse is particular. Thus A propositions, which yield I propositions as conclusions in Conversion, are converted *per accidens*.

Imp

Note 1. Can an A proposition be converted simply?

Ordinarily A propositions cannot be converted simply, but

In Simple Conversion, the quantity of the Converse is the same as the quantity of the Convertend. Hence an A proposition can be said to be converted simply, if we can draw an A proposition from an A proposition by Conversion. In ordinary cases, this is not possible, because, if the converse be an A proposition, its subject will be distributed, though that term, which is the predicate of the Convertend, is not distributed therein. Hence, in ordinary cases, an A proposition cannot be converted simply.

if the subject and the predicate have the same denotation, an A proposition can be converted simply.

There are, however, certain exceptional kinds of A propositions in which *the subject and the predicate have the same denotation*, where Simple Conversion of A propositions is possible. Thus A propositions can be converted simply when the subject and the predicate are both *definite singular terms*, or in the case of *definitions and tautologous propositions*. Thus :

(*i*) A. Everest *is* the highest mountain in the world.
∴ Converse. A. The highest mountain in the world *is* Everest.

(*ii*) A. All men *are* rational animals.
∴ Converse. A. All rational animals *are* men.
(*iii*) A. All men *are* human beings.
∴ Converse. A. All human beings *are* men.

On an examination of these A propositions, we find that in every case, *the subject and the predicate are co-extensive in denotation*, i.e., to say, their denotation is the same. It may be pointed out that Hamilton, in his doctrine of the Quantification of the Predicate, has called these A propositions, U propositions. Hence it may be said that, strictly speaking not A propositions but U propositions are converted simply.

e 2. Conversion by Negation—Conversion of O Propositions.

Ve have seen that an attempt to convert an O Pro-
on involves a violation of the rule regarding distribution
erms. Hence some logicians seek to convert an O
sition, by first of all reducing the O proposition to an
oposition, by transferring the sign of negation to the
cate and then transposing the terms : Thus :

O propositions may be converted by transferring the sign of negation to the predicate.

). Some S is not P. Some men are not honest.
. Some S is not-P. Some men are not-honest.
. Some not-P is S. Some not-honest beings are men.

This form of argument cannot be called Conversion at
ecause, in the first place, the quality of the conclusion
fferent from that of the given proposition and again,
subject of the conclusion is not the predicate of the
ise but its contradictory.

e 3. Inference by Converse Relation.

This form of Conversion is possible, when the subject
he predicate of the given proposition are a pair of relative
, *e.g.*,

When the subject and the predicate are relative terms.

Socrates was the husband of Xanthippe.
. Xanthippe was the wife of Socrates.

is example, "Husband" and "Wife," being relative terms,
ubject and the predicate are transposed and the correlative
e term, indicating the relation, is substituted.

. 3. Obversion.

**Obversion is a kind of Immediate Inference, in
ch there is a change in the quality of the given
osition, while its meaning remains unchanged.**
ther words, Obversion is a process of obtaining
gative equivalent for an affirmative proposition,
an affirmative equivalent for a negative
osition.

Definition of Obversion

The given proposition which is to be obverted is called the **Obvertend,** and the conclusion is called the **Obverse.**

Rules :— The following are the **Rules of Obversion:—**

(*i*) The *subject* of the Obverse is the same as the subject of the Obvertend,

(*ii*) The *predicate* of the Obverse is the contradictory of the given predicate.

(*iii*) The *quality* of the Obverse is the opposite of the quality of the given proposition, *i.e.,* to say, if the Obvertend be affirmative, the Obverse is negative; and if the Obvertend be negative, the Obverse is affirmative.

(*iv*) The *quantity* of the Obverse is the same as that of the given proposition, *i.e.,* if the Obvertend be universal, the Obverse is also universal; and if the Obvertend be particular, the Obverse is also particular.

A—E

(i) Obversion of A.

The Obverse of A is E. Thus :—

Obvertend A. All S is P.	All men are mortal.
∴ Obverse E. No S is not-P.	No men are non-mortal.

We find that the Obvertend is affirmative but the Obverse is negative. The contradictory of the given predicate becomes the predicate in the conclusion, the subject is the same and the quantity is unchanged.

E—A

(ii) Obversion of E.

The Obverse of E is A. Thus :—

Obvertend E. No S is P.	No man is perfect.
∴ Obverse A. All S is not-P.	All men are non-perfect.

I—O

(iii) Obversion of I.

The Obverse of I is O. Thus :—

Obvertend I. Some S is P.	Some men are intelligent.
∴ Obverse O. Some S is not not-P.	Some men are not non-intelligent.

iv) Obversion of O.

O—I

The Obverse of O is I. Thus :—

Obvertend O.	Some S is not P.	Some men are not honest.
∴ Obverse I.	Some S is not-P.	Some men are non-honest.

To sum up: **By Obversion A gives E; E gives A; I gives O; and O gives I.**

Note. Material Obversion.

Bain considers that in addition to the formal process described above, "there are Obverse inferences, justified only on an examination of the *matter* of the proposition." For examples :—

Material Obversion is not a formal process of inference but is based on experience.

(*i*) Warmth is agreeable.
∴ Cold is disagreeable.

(*ii*) War is productive of evil.
∴ Peace is productive of good.

(*iii*) An upright minister gives public confidence.
∴ A shuffling minister causes distrust.

(*iv*) Knowledge is good.
∴ Ignorance is bad.

(*v*) The sight of happy beings gives us pleasure.
∴ The sight of unhappy beings gives us pain.

Bain himself recognises that these inferences are entirely different from the formal inference of Obversion which we are discussing here. None of the rules of Obversion have been followed. In Obversion, the subject of the Obverse is he same as the subject of the given proposition, whereas, in hese cases they are contraries ; in Obversion, the contradictory of the given predicate becomes the predicate of the conclusion, whereas, here, the predicates are also contraries and not contradictories ; lastly, here the quality is the same, whereas, in Obversion, the quality of the conclusion is the opposite of the quality of the given proposition. These nferences are, thus, not formal inferences, but material nferences based on experience and knowledge and do not come within the scope of Deductive Logic.

Sec. 4. Contraposition.

Definition of Contraposition.

Contraposition is a kind of Immediate Inference in which from a given proposition we infer another proposition, having for its subject the contradictory of the given predicate.

The conclusion in Contraposition is called the *Contrapositive;* but there is no corresponding name for the given proposition.

Rules :—

Thus, in Contraposition we have to observe the following **Rules:—**

(*a*) The *subject* of the conclusion is the contradictory of the predicate of the given proposition.

(*b*) The *predicate* of the conclusion is the subject of the given proposition.

(*c*) The *quality* is changed, *i.e.*, to say, if the given proposition be affirmative, the conclusion is negative and *vice versa;* and

(*d*) Lastly, no term can be *distributed* in the conclusion, if it be not distributed in the given premise. When no such improper distribution is involved, the *quantity* of the conclusion is the same as the quantity of the premise, but when there is the possibility of such improper distribution, the conclusion is particular though the premise is universal.

First Obvert, then Convert.

Contraposition is a compound form of Immediate Inference, which involves both Obversion and Conversion. In fact, the simple rule of Contraposition is

First obvert, then convert.

A—E

(i) Contraposition of A.

An A proposition, when obverted, gives E, and E when converted gives E. Therefore, *the Contrapositive of A is E.*

A. All S is P...............(1).
∴ Obverse. E. No S is not-P...............(2).
∴ Converse of (2) E. No not-P is S...............(3).
Contrapositive of (1).

ii) Contraposition of E.

E—I

E obverted gives A, and A converted gives I. Therefore he *Contrapositive of E is I*. Thus :—

E. No S is P...............(1).
∴ Obverse A. All S is not-P...............(2).
∴ Converse of (2) I. Some not-P is S...........(3).
Contrapositive of (1).

In this case, the given proposition is universal but the Contrapositive is particular, because if we attempt to draw universal proposition in the conclusion, we shall have to istribute the subject not-P, which is not distributed in the remise No. (2).

iii) Contraposition of I.

I—x

An I proposition, when obverted, gives O, but an O roposition cannot be converted. Hence **an I proposition cannot e contraposed.**

iv) Contraposition of O.

O—I

An O proposition, when obverted, gives an I proposition, which when converted, gives an I proposition again. Thereore, *the Contrapositive of O is I*. Thus :—

O. Some S is not P...............(1).
∴ Obverse I. Some S is not-P.............(2).
∴ Converse of (2) I. Some not-P is S............(3).
Contrapositive of (1).

To sum up: **By Contraposition, A gives E; gives I; O gives I; but I cannot be contraposed.**

ote 1. Contraposition as a compound form of immediate inference.

Contra-position is a compound form of in-

It has been shown above that the Contrapositive of a roposition, is arrived at by first of all obverting it and then onverting the obverse. Now let us see whether we can ference, in which the correct conclusion is arrived at, by first obverting the given proposition and then converting the obverse.

arrive at the Contrapositive at once by the application of the rules of Contraposition given above :—

Let us first of all, take the case of A and O propositions :—

A. All S is P.   O. Some S is not P.
∴ E. No not-P is S.   ∴ I. Some not-P is S.

In both these cases, we have arrived at the Contrapositive of the given proprositions, by applying the rules directly. Thus, (*i*) The subject of the conclusion is the contradictory of the given predicate ; (*ii*) the predicate of the conclusion is the subject of the given proposition ; (*iii*) the quality is changed, and (*iv*) lastly, no term is distributed in the conclusion, without being distributed in the premise. It may be noted that in the Contrapositive of an A proposition, we have not-P, the subject of the conclusion as distributed. But, as this term did not occur in the given proposition, we cannot take exception to its distribution in the conclusion, on the strnegth of Rule 4 given above.

Let us next consider the case of an E proposition. By the direct application of the rules of Contraposition, we may arrive at the following result :—

E. No S is P.
∴ A. All not-P is S.

In the conclusion, "not-P" is distributed, but as this term did not occur in the given proposition, it cannot be said on the strength of the given rule that there has been any improper distribution. But nevertheless, this conclusion is not legitimate, as would be clear, when we first obvert the given proposition and then, convert the obverse. As already shown, the conclusion may be arrived at in the following way :—

E. No S is P, ... (1)
∴ Obverse A. All S is not-P . . . . (2)
∴ Converse of (2). I. Some not-P is S.

It is clear that if we have "All not-P is S," in the conclusion, it would involve improper distribution as judged by the rules of Conversion.

Hence, we find that in the case of E propositions, the proper conclusion cannot be arrived at directly. This proves t Contraposition is not a simple form of Immediate infer-ce like Conversion and Obversion. It is a compound form Immediate inference, in which, the proper conclusion can ly be drawn by first obverting the given proposition and en converting the Obverse.

ote 2. The Contrapositive is different from the Obverted Converse.

The Contrapositive is the same as the Converted Ob-erse. It is needless to say, that the Converted Obverse is ifferent from the Obverted Converse. In Contraposition, e first obvert, then convert, while in Obverted Converse, we rst convert, then obvert. Thus :

Contrapositive= converted obverse.

A. All S is P............................(1)
∴ Converse of (1) I. Some P is S.............(2)
∴ Obverse of (2) O. Some P is not not-S......(3)
Obverted Converse.

The Contrapositive of “All S is P,” however, is “No ot-P is S.”

ec. 5. Inversion.

Inversion is a kind of Immediate Inference in hich from a given proposition we infer another roposition, having for its subject the contradic-ory of the given subject.

Inversion is a compound form of Immediate Inference.

The given proposition, which is to be inverted, s called the **Invertend** and the conclusion, which ollows, is called the **Inverse.**

Inversion is of two kinds—Complete and Partial, he difference between them being that in **Complete nversion,** the predicate of the Inverse is the contra-ictory of the given predicate, while in **Partial nversion,** the predicate of the inverse is the same s the given predicate.

Complete and Partial Inversion.

The following **Rules** have to be observed in nversion :

Rules of Inversion :—

(*a*) The *subject* of the Inverse is the contradictory of the subject of the Invertend.

(*b*) As to the *predicate* of the Inverse, in Partial Inversion, the predicate is the same; whereas, in Complete Inversion, the predicate of the Inverse is the contradictory of the original predicate.

(*c*) The *quantity* of the Invertend is universal, whereas, the quantity of the Inverse is particular. Thus **only universal propositions can be inverted** and the Inverse must always be a particular proposition.

(*d*) In Complete Inversion, the *quality* of the Inverse is the same as that of the Invertend, while, in Partial Inversion, the quality is different.

How to reach the Inverse?

We may note here, that Inversion, like Contraposition, is a *compound form of Immediate inference*, involving Obversion and Conversion. In Contraposition, we first obvert, then convert, but in Inversion, there is no such definite rule. In Inversion, our aim is *to have in the subject of the conclusion, the contradictory of the original subject* and with this object in view, we go on applying the dual process of Obversion and Conversion, *in any order*, according to convenience, till we reach the desired result. If, by beginning with Obversion, our progress is stopped, before we reach the desired goal, *viz.*, the contradictory of the given subject as the subject of the conclusion, we should give up that process and begin with Conversion ; and *vice versa*. Thus :

(i) A—I (Complete) —O (partial)

(i) Inversion of A.

Invertend A. All S is P......................(1)
∴ Obverse of (1) E. No S is not-P............(2)
∴ Converse of (2) E. No not-P is S............(3)
∴ Obverse of (3) A. All not-P is not-S..........(4)
∴ Converse of (4) I. Some not-S is not-P......(5)
(Complete Inverse).
∴ Obverse of (5) O. Some not-S is not P......(6)
(Partial Inverse).

If we had begun with Conversion, our career would have en stopped, before the Inverse was reached. Hence we gan with Obversion.

Thus *A gives I by Complete Inversion and O by Partial iversion.*

ii) Inversion of E.

(ii)
E—O
(Complete)
—I(Partial)

Invertend E. No S is P....................(1)
∴ Converse of (1) E. No P is S.............(2)
∴ Obverse of (2) A. All P is not-S...........(3)
∴ Converse of (3) I. Some not-S is P..........(4)
(Partial Inverse).
∴ Obverse of (4) O. Some not-S is not not-P....(5)
(Complete Inverse).

Thus, *E gives O by Complete Inversion and I by Partial nversion.* In this case, if we had began by obverting, we ould not have reached the Inverse.

iii) Inversion of I.

(iii) I—
no inverse.

et us first begin with Obversion.

Invertend. I. Some S is P..................(1)
∴ Obverse of (1) O. Some S is not not-P.........(2)
This cannot be converted.

et us now begin with Conversion.

Invertend. I. Some S is P..................(1)
∴ Converse of (1) I. Some P is S..............(2)
∴ Obverse of (2) O. Some P is not not-S........(3)
This cannot be converted.

Thus, in neither case, can the Inverse be reached. herefore, *an I proposition cannot be inverted.*

iv) Inversion of O.

(iv O—
no inverse.

et us first begin with Obversion.

Invertend O. Some S is not P..............(1)
∴ Obverse of (1) I. Some S is not-P..........(2)
∴ Converse of (2) I. Some not-P is S..........(3)
∴ Obverse of (3) O. Some not-P is not not-S....(4)
This cannot be converted.

Let us now begin with Conversion.

Invertend. O. Some S is not P.

This cannot be converted.

Thus, in neither case, can the Inverse be reached.

Therefore, *O cannot be inverted.*

To sum up: **By Complete Inversion, A gives I and E gives O; by Partial Inversion, A gives O, and E gives I; but I and O propositions cannot be inverted.**

Note. Table of Comparison of the four principal forms of Immediate Inference.

	Conversion.	Obversion.	Contraposition.	Partial Inversion.	Complete Inversion.
Subject of the conclusion.	= Predicate of the premise.	= Subject of the premise.	= Contradictory of the predicate of the premise.	= Contradictory of the subject of the premise.	= Contradictory of the subject of the premise.
Predicate of the conclusion.	= Subject of the premise.	= Contradictory of the predicate of the premise.	= Subject of the premise.	= Predicate of the premise,	= Contradictory of the predicate of the premise.
Quantity of the conclusion.	Same in E & I: different in A; O—no conclusion.	Same.	Same in A. & O; different in E; I-no conclusion.	Invertend —universal; Inverse —particular.	Invertend —universal: Inverse —particular.
Quality of the conclusion.	Same.	Opposite.	Opposite.	Opposite.	Same

This table shows that the four forms of Immediate Inference can be compared with one another, from the following four points of view :—

(*i*) *The Subject of the conclusion.*

In Conversion. the subject of the conclusion is the pre- ite of the premise ; in Obversion, the subject of the con- sion is the same as the subject of the premise ; in Contra sition, the subject of the conclusion is the contradictory the predicate of the premise ; and lastly, in Inversion, the ject of the conclusion is the contradictory of the subject the premise.

(*ii*) *The Predicate of the conclusion.*

In Conversion, the predicate of the conclusion is the bject of the premise ; in Obversion, the predicate of the nclusion is the contradictory of the predicate of the premise ; Contraposition, the predicate of the conclusion is the sub- ct of the premise ; and lastly, in Complete Inversion, the edicate of the conclusion is the contradictory of the predi- te of the premise and in Partial Inversion, the predicate the conclusion is the same as the predicate of the premise.

(*iii*) *Quantity of the conclusion.*

In Conversion, the Quantity of the conclusion is the me as that of the premise in the cases of E and I while the case of A, the conclusion is particular while the pre- ise is universal. Thus the quantity is sometimes the same, metimes different.

In Obversion, the quantity of the conclusion is the same the quantity of the premise.

In Contraposition, the quantity of the conclusion is the me as that of the premise in the case of A and O, while the case of E, the conclusion is particular while the pre- ise is universal. Thus the quantity is sometimes the same, metimes different.

In Inversion, the quantity of the conclusion is always rticular while the quantity of the premise is always uni- rsal. Thus the quantity of the conclusion is always different om that of the premise.

(*iv*) *Quality of the conclusion.*

In Conversion, the quality of the conclusion is the same that of the premise; in Obversion and Contraposition, the ality of the conclusion is the opposite of that of the premise ;

in Complete Inversion, the quality of the conc. is the same as that of the premise, while in Partial Inve. the quality of the conclusion is the opposite of the qualit the premise.

The following table gives the results at a glance.

Given Prop.	Conversion.	Obversion.	Contra-position.	Complete Inversion.	Partial Inversion.
A	I	E	E	I	O
E	E	A	I	O	I
I	I	O			
O		I	I		

Sec. 6. Opposition.

Opposition as a form of Immediate Inference.

The word 'Opposition' has been used to mean a particular kind of relation between two propositions and also a kind of Immediate Inference. In the former sense, as we have seen, there are four kinds of Opposition, *viz.*, Subalternation, Contradictory Opposition, Contrary Opposition and Sub-contrary Opposition. *Opposition as a form of Immediate inference, means the inferring of one proposition from another, in any of the four kinds of relations mentioned above.* We shall consider the different forms separately.

1. Subalternation.

Subalternation.

Subalternation is the relation existing between two propositions, having the same subject and the same predicate, but *differing in quantity only* i e. to say, the relation between A and I; E and O. The **Rules** of inference in Subalternation are the following:—

Rules :—

Rule (1). The truth of the universal implies the truth of the corresponding particular, but not conversely; and

Rule (2). The falsity of the particular implies the falsity of the corresponding universal, but not conversely.

(1) If the universal be true, the particular is true; but not conversely.

Rule (1). *If the universal be true, the corresponding particular is also true.* If A be true, I is true; if E be true, O is true. If the proposition 'All men are mortal' be true, then the proposition 'Some men are mortal' is certainly true. Similarly, if the proposition 'No man is perfect' be true, the proposition 'Some men are not perfect' must be true.

The converse of this rule, however, is not true. If the particular proposition be true, the universal is doubtful, *i.e.*, sometimes true, sometimes false. For example: the particular proposition 'Some men are mortal' is true and the corresponding universal proposition 'All men are mortal' is also true; but the particular proposition 'Some men are wise' is true, while the corresponding universal proposition 'All men are wise' is false. Thus, when the particular is true, the universal is doubtful.

(2) If the particular be false, the universal is false;

Rule (2). *If the particular be false, the universal is false.* If I be false, A is false; if O be false, E is false. If the proposition 'Some men are perfect' be false, the corresponding universal proposition 'All men are perfect' is certainly false; if the proposition 'Some men are not mortal' be false, the corresponding universal proposition 'No man is mortal' is certainly false.

but not conversely.

The converse of this rule is not true, i.e., if the universal be false, we cannot infer anything definitely with regard to the corresponding particular, *i.e.*, the particular may be false or may be true. For example: the universal proposition 'All men are perfect' is false and at the same time, the corresponding particular proposition 'Some men are perfect' is also false. But the universal proposition 'All men are wise' is false while the corresponding particular proposition 'Some men are wise' is true. Thus, when the universal is false, the particular is doubtful.

To sum up: If A be true, I is true; and if E be true, O is true; but if I be true, A is doubtful; and if O be true, E is doubtful. Again, if I be false, A is false; and if O be false, E is false; but if A be false, I is doubtful; and if E be false, O is doubtful.

2. Contrary Opposition.

Contrary Opposition.

Contrary Opposition is the relation between two *universal propositions,* having the same subject and the same predicate, but differing in *quality,* i.e., to say, the relation between A and E propositions. The rule of inference in Contrary Opposition is as follows:

Rule. If one be true, the other is false but not conversely.

Rule. *The truth of the one implies the falsity of the other; but not conversely.*

If A be true, E is false; if E be true, A is false. If the A proposition 'All men are mortal' be true, the corresponding E proposition 'No man is mortal' is false; if the E proposition 'No man is perfect' be true, the corresponding A proposition 'All men are perfect' is false.

The converse is not true, i.e., the falsity of the one does not imply the truth of the other. Thus, the A proposition 'All men are wise' is false, but the corresponding E proposition 'No man is wise' is equally false. But the A proposition 'All men are perfect' is false while the corresponding E proposition 'No man is perfect' is true. Thus, if A be false, E is doubtful. Similarly, it can be shown that if E be false, A is doubtful.

To sum up: If A be true, E is false and if E be true, A is false. But if A be false, E is doubtful and if E be false, A is doubtful.

3. Sub-Contrary Opposition.

Sub-Contrary Opposition.

Sub-Contrary Opposition is the relation between two *particular* propositions, having the same subject and the same predicate, but differing in *quality*, i.e., to say, the relation between I and O propositions. The rule of inference in Sub-Contrary Opposition is as follows:

Rule : If one be false, the other is true

Rule. *The falsity of the one implies the truth of the other; but not conversely.*

If I be false, O is true; if O be false, I is true. If the I proposition 'Some men are perfect' be false, the corresponding O proposition 'Some men are not perfect' is true; if the O proposition 'Some men are not mortal' be false, the corresponding I proposition 'Some men are mortal' is true.

but not conversely.

The converse is not true, i.e., the truth of the one does not imply the falsity of the other. Thus, the I proposition 'Some men are wise' is true and at the same time, the corresponding O proposition 'Some men are not wise' is equally true. But the I proposition 'Some men are mortal' is true, while the corresponding O proposition 'Some men are not mortal' is false. Thus, if I be true, O is doubtful. Similarly, it can be shown that if O be true, I is doubtful.

To sum up: If I be false, O is true and if O be false, I is true. But if I be true, O is doubtful and if O be true, I is doubtful.

4. Contradictory Opposition.

Contradictory Opposition.

Contradictory Opposition is the relation between two propositions, having the same subject and the same predicate, but *differing both in quantity and in quality*, i.e., to say, the relation between A and O; E and I. The rule of Inference in Contradictory Opposition is as follows:

Rule. *The truth of the one implies the falsity of the other and vice versa.*

Contradictory Opposition is the perfect form of Opposition.

This rule states that of two contradictory propositions, if one be true, the other is false and if one be false, the other is true. Both cannot be true and both cannot be false. One of them must be true and one of them must be false. We have seen, according to the Law of Contradiction, one of the contradictory propositions must be false; and according to the Law of Excluded Middle, one of the contradictory propositions must be true. Thus in Contradictory Opposition, the relation of opposition is reciprocal—the opposites can be mutually inferred from each other. In no other form of Opposition, are the two propositions opposed to each other with regard to both truth and falsehood. Hence *Contradictory Opposition is the perfect form of logical Opposition.*

Thus, in Contradictory Opposition, the following results may be obtained:—

If A be true, O is false.
If A be false, O is true.
If O be true, A is false.
If O be false, A is true.

If E be true, I is false.
If E be false, I is true.
If I be true, E is false.
If I be false, E is true.

The following **Table** shows the above results at a glance:—

Given.		A.	E.	I	O.
1	A true.		False.	True.	False.
2	A false.		Doubtful.	Doubtful.	True.
3	E true.	False.		False.	True.
4	E false.	Doubtful.		True.	Doubtful.
5	I true.	Doubtful.	False.		Doubtful.
6	I false.	False.	True.		True.
7	O true.	False.	Doubtful.	Doubtful.	
8	O false.	True.	False.	True.	

Sec. 7. Modal Consequence.

Modal Consequence

According to Modality, as we have seen, Propositions can be divided into Necessary, Assertory and Problematic. **Modal Consequence is a form of inference, in which we infer a proposition of one modality, from a proposition of a different modality.** The rules which govern this form of inference are the following:

Rules :
I. If the proposition of higher

Rule 1. *The truth of a proposition, of higher certainty, implies the truth of a proposition, of lower certainty; but not conversely.*

certainty be true, the proposition of lower certainty is true; but not conversely.

If a Necessary proposition be true, the corresponding Assertory and Problematic propositions are true. For example, if the proposition 'A must be B' be true, the propositions, 'A is B' and 'A may be B' are certainly true. Similarly, if an Assertory proposition be true, the corresponding Problematic proposition is also true. If 'A is B' be true, 'A may be B' is also true. It is quite clear that *the converse is not true*, i.e., we cannot infer that because a proposition of lower certainty is true, therefore, the corresponding proposition of higher certainty is true.

2. If the proposition of lower certainty be false, the proposition of higher certainty is also false; but not conversely.

Rule 2. *The falsity of a proposition, of lower certainty, implies the falsity of a proposition of higher certainty, but not conversely.*

If a Problematic proposition be false, the corresponding Assertory and Necessary propositions are certainly false. If an Assertory proposition be false, the corresponding Necessary proposition is also false. *The converse is not true*, i.e., we cannot infer that because a proposition of higher certainty is false, therefore, a corresponding proposition of lower certainty is also false.

Sec. 8. Change of Relation.

What is Change of Relation?

According to Relation, as we have seen, propositions have been divided into Categorical and Conditional. Conditional propositions, again, have been sub-divided into Hypothetical and Disjunctive. **Change of Relation is the inferring of a proposition of one relation, from a proposition of a different relation.** Hence, there may be four forms of this inference as follows:

1. A Hypothetical from a Categorical.
2. A Categorical from a Hypothetical.
3. Hypotheticals from a Disjunctive.
4. A Disjunctive from Hypotheticals.

Let us take them up one by one.

In inferring a hypothetical from a categorical, or a categorical from a hypothetical, we should remember the following:

(*a*) The antecedent of a hypothetical proposition corresponds to the subject of a categorical proposition :

(*b*) The consequent of a hypothetical proposition corresponds to the predicate of a categorical proposition :

(*c*) The quantity of a hypothetical proposition depends on the quantity of its antecedent ; and

(*d*) The quality of a hypothetical proposition depends on the quality of its consequent.

1. *A Hypothetical from a Categorical.*

1. Hypothetical from Categorical.

Categorical.	*Hypothetical.*
A. All S is P	=If S is, P is.
All men are mortal	=If men are (exist), mortality is (exists).
E. No S is P	=If S is, P is not.
No man is perfect	=If men are (exist), perfection is not (does not exist).
I. Some S is P	=If sometimes S is, P is.
Some men are wise	=If, in some cases, men exist, wisdom exists.
O. Some S is not P	=If sometimes S is, P is not.
Some men are not wise	=If, in some cases, men exist, wisdom does not exist.

2. *A Categorical from a Hypothetical.*

2. Categorical from Hypothetical.

Hypothetical.	*Categorical.*
A. If A is B, C is D	=All cases of A being B are cases of C being D.
If he comes, I go	=All cases of his coming are cases of my going.
E. If A is B, C is not D	=No case of A being B, is a case of C being D.
If it rains, I do not go out.	=No case of raining is a case of my going out.
I. If, in some cases, A is B, C is D.	=Some cases of A being B are cases of C being D.

If, in some cases, a man is born poor, he attains success. = Some cases of men born poor are cases of successful men.

O. If, in some cases, A is B, C is not D. = Some cases of A being B are not cases of C being D.

If, in some cases, men are rich, they are not happy. = Some cases of rich men are not cases of happy men.

3. *Hypotheticals from a Disjunctive.*

3 Hypotheticals from a Disjunctive. According to Mill, there are *two*,

According to **Mill,** the falsity of one alternative, of a disjunctive proposition, implies the truth of the other alternative *but not conversely.* Thus, according to Mill, from the disjunctive proposition, A is either B or C, the following two hypotheticals may be inferred:

(1) If A is not C, A is B; and
(2) If A is not B, A is C.

according to Ueberweg there are *four* hypotheticals.

According to **Ueberweg,** the falsity of one alternative of a disjunctive proposition implies the truth of the other *and conversely.* Thus, according to Ueberweg, from the disjunctive proposition, A is either B or C, the following four hypothetical propositions may be inferred:

(1) If A is not C, A is B;
(2) If A is not B, A is C;
(3) If A is C, A is not B; and
(4) If A is B, A is not C.

Thus, according to Ueberweg, the alternatives of a disjunctive proposition are *like two contradictory propositions,* while according to Mill, they are *like two sub-contrary propositions.*

Ueberweg —The two alternatives

Let us take the following concrete examples: 'He is either virtuous or non-virtuous;' it is clear, that in this case, the two alternatives, *viz.*, "he is virtuous" and "he is non-virtuous," are mutually exclusive and hence we may draw the following four hypotheticals from this disjunctive proposition:

(1) If he is not virtuous, he is non-virtuous;
(2) If he is not non-virtuous, he is virtuous;
(3) If he is virtuous, he is not non-virtuous; and
(4) If he is non-virtuous, he is not virtuous.

are like two contradictory propositions—if one be true, the other is false and *vice versa.*

In this case, Ueberweg's view is correct. But, if we take the proposition "He is either a fool or a knave", the alternatives "He is a fool" and "He is a knave" are not mutually exclusive and hence, here, Ueberweg's view would not hold good. In this case, Mill's view will prevail and this disjunctive proposition would be equivalent to the following two hypotheticals:

(1) If he is not a fool, he is a knave; and
(2) If he is not a knave, he is a fool.

But according to Mill, the alternatives are like two sub-contrary propositions—if one be false, the other is true but not *vice versa.*

The question, as to which view is correct, would depend on *whether as a matter of fact, the alternatives are mutually exclusive or not.* If they are mutually exclusive, Ueberweg is correct; if they are not, Mill is correct. It may be pointed out, however, that as Ueberweg's view is correct, only under certain special circumstances, *viz.*, when the alternatives are mutually exclusive, Mill's view, which holds good under all conditions, ought to be preferred.

4. *A Disjunctive from Hypotheticals.*

This is just the converse process of the third form. It is not necessary to repeat that according to Ueberweg, a disjunctive proposition can be inferred from four hypotheticals, as explained above, whereas, according to Mill, a disjunctive proposition can be inferred from two hypotheticals.

4. A Disjunctive from Hypotheticals.

Sec. 9. Inference by Added Determinants.

Inference by Added Determinants.

By a **"Determinant"** we understand an adjective or a similar qualification which *determines,* i.e., to say, limits the application of the term. As the qualification does not belong to the term, in its entire denotation, the determinant has the effect of rendering the meaning of the term, narrower or 'determined.'

Inference by Added Determinants is the drawing from a given proposition, another proposition of narrower extent, by limiting both the subject and the predicate of the given proposition, in an identical way. For example:

A comet is a material body.
∴ A *visible* comet is a *visible* material body.

The subject and the predicate should be affected in the same way.

The correctness of an inference of this description depends on the fact, that *the subject and the predicate must be determined or limited in the same way.* The inference will be necessarily true, when the meaning of the determinant is exactly the same in the case of the subject and the predicate. This is not always secured even by the use of the same word; for, the same word is liable to have different meanings, in different contexts, and in such cases, the inference will be fallacious. If the attributes, added as determinants, imply comparison, the possibility of committing fallacies is greatly increased. For example:

An ant is an animal.
∴ A *large* ant is a *large* animal.

This inference is obviously fallacious, because the determinant 'large' affects the subject and the predicate in different ways.

Examples of correct inferences.

(1) All Negroes are men.
∴ All honest Negroes are *honest* men.

(2) Wrongdoers are deserving of punishment.
∴ *Male* wrongdoers are *males* who deserve punishment.
(3) Poetry is food for the intellect.
∴ *Good* poetry is *good* food for the intellect.
(4) All metals are elements.
∴ All *very heavy* metals are *very heavy* elements.
(5) A ball is a plaything.
∴ A *rubber* ball is a *rubber* plaything.
(6) A dog is an animal.
∴ A *faithful* dog is a *faithful* animal.

Examples of fallacious inferences.

(1) A singer is a man.
∴ A *bad* singer is a *bad* man.
(2) A statesman is a man.
∴ A *good* statesman is a *good* man.
(3) A cottage is a building.
∴ A *huge* cottage is a *huge* building.
(4) Little learning is a dangerous thing.
∴ *Greater* learning is a *more* dangerous thing.
(5) An elephant is an animal.
∴ A *small* elephant is a *small* animal.

Sec. 10. Inference by Complex Conception.

Complex Conception.

Inference by Complex Conception consists in employing the subject and the predicate of a proposition, as parts of a more complex conception, without altering the relation between them.

Example:

A horse is a quadruped animal.
∴ *The head of* a horse is *the head of* a quadruped animal.

'Added Determinants, and 'Complex Conception' compared.

This mode of inference is similar to the preceding form of Inference. There is however an important point of difference. In Inference by Added Determinants, the determinant or qualification is added to the subject and the predicate, while, in Inference by Complex Conception, the subject and the predicate themselves are used as determinants or qualifications of a third term. In the former case, an adjective is added to the subject and the predicate, whereas, in the latter, the subject and the predicate are themselves used as adjectives of a third term.

Fallacy. This kind of inference is also liable to *fallacy*, if the new complex conception has different meanings in the subject and the predicate. For example:

All Judges are men.
∴ *A majority of* Judges is *a majority of* men.

Correct inferences.

(1) Arsenic is a poison.
∴ A *dose of* Arsenic is a *dose of* poison.
(2) Poverty is a temptation to crime.
∴ *The removal* of poverty is *the removal of* a temptation to crime.
(3) The horse is an animal.
∴ The *skeleton of* a horse is *the skeleton of* an animal.

Fallacious inferences.

(1) All Judges are lawyers.
∴ *A majority of* Judges is a *majority of* lawyers.
(2) All poets are verse-writers.
∴ *A large number of* poets is *a large number of* verse-writers.
(3) All Protestants are Christians.
∴ A *majority of* Protestants is *a majority of* Christians.

Exercises Worked Out.

1. *Examine the following :—*
Books are a source of instruction.
Therefore, our knowledge must come from books.

ANSWER.—Logically expressed, the argument would stand thus :—

A. All books are sources of knowledge.
∴ A. All sources of knowledge are books.

This is an improper Simple Conversion of an A proposition, in which the predicate is undistributed. The correct inference should be: "I. Some sources of knowledge are books."

2. *What kind of inference have we here?*
Only the ignorant despise knowledge.
∴ *Some persons despising knowledge are ignorant.*

ANSWER.—Logically expressed, the argument stands hus :—

A. All persons, despising knowledge, are ignorant.
∴ I. Some persons, despising knowledge, are ignorant.

This is a correct example of Subalternation.

3. *Supposing the proposition, "Some stones are not nineral," to be false, what can you know about the truth nd falsity of its opposites?*

ANSWER.—The following are its opposites :—

(*a*) Contradictory. A. All stones are minerals—true.
(*b*) Sub-contrary. I. Some stones are minerals—true.
(*c*) Subalternant. E. No stones are minerals—false.

4. *Show what conclusions, if any, can be derived from he following proposition as premise, according to Conversion, bversion, Contraposition and Inversion:*
All men are not poets.

ANSWER.—This proposition is equivalent to :—

O. Some men are not poets.
(*a*) It cannot be converted.
(*b*) Obverse. I—Some men are non-poets.
(*c*) Contrapositive. I.—Some non-poets are men.
(*d*) It cannot be inverted.

5. *Examine the following Immediate inference:*
Absolute difference excludes all likeness.
∴ *Any likeness is a proof of sameness.*

ANSWER.—Logically expressed, the argument stands hus :—

E. No cases of absolute difference are cases of likeness.
∴ A. All cases of likeness are cases of absolute sameness.

This is incorrect, for the following reason :

E. No cases of absolute difference are cases of likeness. . . . . (1)
∴ Converse. E. No cases of likeness are cases of absolute difference. (2)
∴ Obverse. A. All cases of likeness are cases of non-absolute differences. (3)

This inference is correct. But instead of the predicate non-absolute differences," we have "absolute sameness", *i.e.*, nstead of the contradictory of the predicate in proposition o. (2), we have in the given conclusion, the contrary. This s not permissible.

6. *Has the following any converse? Give reasons for our answer.*

Few persons are proof against temptation.

ANSWER.—This proposition, when expressed in logical form, stands thus :—

O. Some persons are not proof against temptation.

This is an O proposition and as such cannot be converted.

7. *Give the obverse of*

(*a*) *Only ignorant persons hold such opinions.*

ANSWER.—This is equivalent to, "All persons who hold such opinions are ignorant," and when obverted gives E.—"No persons who hold such opinions are non-ignorant."

(*b*) *Many are the deserving men, who are unfortunate.*

ANSWER.—This is equivalent to "Some unfortunate persons are deserving,"—Obverted, it becomes O.—"Some unfortunate persons are not non-deserving."

8. *Draw the inference which follows from the proposition ; None but the industrious deserve success.*

ANSWER.—The proposition is equivalent to "All persons who deserve success are industrious."

The following conclusions can be drawn :—

(*a*) Converse : I.—Some industrious presons are those who deserve success.

(*b*) Obverse : E.—No persons who deserve success *are* non-industrious.

(*c*) Contrapositive : E.—No non-industrious persons *are* persons who deserve success.

(*d*) Inverse :

Complete. I.—Some non-deserving persons *are* non-industrious.

Partial. O.—Some non-deserving persons *are not* industrious.

9. *Give the inferences that follow by Conversion and Contraposition, from each of the following :—*

(*i*) *There is no man that is not naturally good.*

ANSWER.—Logical form :—

All men are naturally good.

Converse. I.—Some naturally good beings are men.

Contrapositive. E.—No non-naturally good beings are men.

(*ii*) *Men are never happy, if they are not virtuous.*

ANSWER.—Logical form :—

No non-virtuous men are happy.

Converse. E.—No happy beings are non-virtuous.

Contrapositive. I.—Some non-happy persons are non-virtuous.

(*iii*) *Oh Ingratitude ! thou marble-hearted fiend !*

ANSWER.—Logical form :—

A. All ungrateful men are marble-hearted fiends.

Converse. I.—Some marble-hearted fiends are ungrateful.
Contrapositive. E.—No non-marble-hearted fiends are ungrateful men.

10. (*a*) *All lawyers are not knaves.*
(*b*) *None but graduates are eligible.*

Put each of the above propositions into exact logical form nd consider what propositions can be inferred by (i) Conersion and (ii) Obversion.

Answer.—(*a*) Logical form :—
Some lawyers are not knaves—O.
Converse. An O proposition cannot be converted.
Obverse. I.—Some lawyers are non-knaves.
Answer.—(*b*) Logical form :—
All eligible persons are graduates—A.
Converse. I.—Some graduates are eligible.
Obverse. E.—No eligible persons are non-graduates.

11. *Are the following inferences correct?*
(*a*) *If the good people are happy, unhappiness is an indication of vice.*

Answer.—Logical form of the argument :—
All good people are happy.
∴ All unhappy men are vicious.
Let us take the premise.
A. All good people are happy.
By Obversion. E.—No good people are non-happy.
By Conversion. E.—No non-happy men are good.
By Obversion. A.—All non-happy men are not-good.

This conclusion, thus, can be legitimately drawn from the given premise, "All good people are happy," but the conclusion actually drawn is, "All unhappy men are vicious." This is wrong, because "non-happy" is not the same as "unhappy," nor is "non-good," same as "vicious."

(*b*) *No Intermediate student reads Mill's Logic.*
∴ There are some other students who read the book.

Answer.—Logically expressed, the argument stands thus :—

No Intermediate students *are* persons who read Mill's Logic.
∴ Some non-Intermediate students *are* persons who read Mill's Logic.

In this argument, we find the contradictory of the given subject is the subject of the conclusion and the given predicate s the predicate of the conclusion. Therefore, it is a case of Partial Inversion. The above argument is correct.

12. *Test the following Immediate inferences, explaining the fallacy, if any, in each case :—*
(*a*) *All philosophers are not unpractical men.*
∴ Some unpractical men are not philosophers.

ANSWER.—Logical form of the argument :—

Some philosophers are not unpractical.
∴ Some unpractical men are not philosophers.

In this case there is an attempt to convert an O proposition, but that is not possible.

(*b*) *Most shop-keepers are honest men.*
∴ Some dishonest men are not shop-keepers.

ANSWER.—Logical form :—

I. Some shop-keepers are honest men.
∴ O. Some dishonest men are not shop-keepers.

This is an attempted contraposition of an I proposition, which, under the rules, cannot be contraposed.

(*c*) *All equilateral triangles are equiangular.*
∴ All equiangular triangles are equilateral.

ANSWER.—This is a simple conversion of an A proposition. But as the A proposition has got its subject and its predicate, co-extensive in extent, this simple conversion is permissible.

Exercise X.

1. Explain what is meant by Conversion of propositions. Conversion is sometimes described as a form of Inference. Has it any claims to be considered as such?

2. Distinguish between Obversion, Contraposition and Inversion, giving concrete examples of each.

3. (*i*) Prove by means of the contradictory Propositions that sub-contrary propositions cannot both be false.

(*ii*) Show by means of the sub-contrary propositions that contrary propositions may both be false.

ANSWER.—(*i*) Sub-contrary propositions (I and O) cannot both be false. Supposing they are both false, then their contradictories (E and A respectively) must be both true. According to the rules of Contrary Opposition, however, A and E cannot both be true. Hence Sub-contrary propositions cannot both be false.

(*ii*) Contrary propositions may both be false. Now, Sub-contrary propositions (I and O) may both be true. Therefore, their contradictories (E and A respectively) may both be false.

4. Is it ever possible to derive a conclusion from a single premise? If it is, name and define the different ways of doing it.

5. Indicate the character of Immediate Inference. Can it properly be regarded as an inference? Distinguish between

Simple Conversion and Conversion by limitation. What is Conversion by Negation?

6. Classify Inferences with examples. Explain the character of Contraposition as an Inference. Is it a form of mediate or immediate Inference?

7. Distinguish between Contraposition and Inversion. Are they forms of mediate or immediate inference? Can every proposition be contraposed or inverted? Illustrate your answer by examples.

8. Distinguish between immediate and mediate inference. State and illustrate the rules of immediate inference by contrary and sub-contrary opposition respectively.

9. Define Inference. Is Immediate Inference *real* inference or mere verbal transformation? Discuss the question.

Convert.—Where there is a will, there is a way.
Obvert.—Not a few members were present.
Contrapose.—Few persons are proof against temptation.

10. What can you infer by Conversion from the proposition.—Fools rush in where angels fear to tread?

11. (*a*) Convert.—None but elements are metals.
(*b*) Obvert.—No men are perfect.
(*c*) Contrapose.—All men are mortal.
(*d*) What propositions are true, false or doubtful (*i*) when A is true, (*ii*) when O is false?

12. Give the rules of Immediate Inference (*a*) by Contrary, and (*b*) by Sub-Contrary Opposition. Test the folowing immediate inferences:—

(*i*) Sweet is agreeable. ∴ Bitter is disagreeable.
(*ii*) A lawyer is a man. ∴ A good lawyer is a good man.

13. Prove by means of the rule of Sub-Contrary Opposiion that Contrary Propositions cannot both be true.

14. Give the obverse and the contrapositive of the ollowing:—

(*a*) Only the educated are fit to vote.
(*b*) A few drops of rain are not of much consequence.
(*c*) Man proposes, God disposes.
(*d*) A few men will not suffice to remove this big table.

15. Explain and exemplify the distinction between Conersion, Contraposition, and Obversion. Can every proposition e contraposed or converted?

16. Distinguish between Mediate and Immediate inference, iving concrete illustrations. What is Inversion, and what are s different forms? Explain with illustrations.

17. Define and illustrate Conversion and Obversion as modes of Immediate inference. Explain why the proposition O cannot be converted and the proposition I cannot be contraosed.

18. Examine the validity of the following immedia inferences :—

(*a*) Uneasy lies the head that wears a crown ;
∴ Easy lies the head that wears no crown.
(*b*) The pen is mightier than the sword ;
∴ The sword avails less than the pen.
(*c*) A professor is a man ;
∴ A bad professor is a bad man.
(*d*) No one is admitted without payment ;
∴ All who are admitted are persons who paid.
(*e*) All mangoes are not sweet ;
∴ All sweet things are not mangoes.
(*f*) Only children behave in this way ;
∴ Every one who behaves thus is a child.
(*g*) Prudence is a virtue ;
∴ A prudent man is a virtuous man.
(*h*) Virtue leads to happiness.
∴ Happiness leads to Virtue.
(*i*) Honesty is the best policy.
∴ Dishonesty is the worst policy.
(*j*) Uneducated men take wrong decisions.
∴ No right decisions are taken by the uneducated.

19. Convert the following propositions :—

(*i*) Hydrogen is the lightest body known.
(*ii*) The proper study of mankind is man.
(*iii*) The King of England is the Emperor of India

20. Draw all the conclusions you can by immedia inference from 'All men are mortal'.

CHAPTER XI.

SYLLOGISM.

Sec. 1. Definition of Syllogism—its characteristics.
Sec. 2. Structure of Syllogism.
Sec. 3. Kinds of Syllogism.
Sec. 4. Canons or Fundamental principles of Pure Syllogism.
Sec. 5. Aristotle's *Dictum de omni et nullo.*
Sec. 6. Lambert's Canons.
Sec. 7. General Rules of Categorical Syllogism and their violations leading to Fallacies.
Sec. 8. Figure of Syllogism.
Sec. 9. Mood of Syllogism.
Sec. 10. Determination of Valid moods.
  (*a*) First Figure.
    Note 1. Special Rules of the First Figure.
    Note 2. Special characteristics of the First Figure.
  (*b*) Second Figure.
    Note. Special Rules of the Second Figure.
  (*c*) Third Figure.
    Note. Special Rules of the Third Figure.
  (*d*) Fourth Figure.
    Note. Special Rules of the Fourth Figure.
Sec. 11. Reduction—Direct and Indirect.
    Note. Is Reduction necessary?
Sec. 12. The Mnemonic lines.
Sec. 13. Direct Reduction of all imperfect moods.
Sec. 14. Indirect Reduction of all imperfect moods.
Sec. 15. Fundamental, Weakened and Strengthened Syllogism.
Sec. 16. Pure Hypothetical and Pure Disjunctive Syllogism.
Exercise XI.

Sec. 1. Definition of Syllogism—its characteristics.

Definition. **A Syllogism is a form of mediate deductive inference, in which the conclusion is drawn from two premises, taken jointly.** It is a form of *deductive* inference and therefore, in it, the conclusion cannot be more general than the premises. It is a *mediate* form of inference, the conclusion being drawn from two premises and not from one premise only as in the case of Immediate Inference. To take an example:

All men are mortal.
All kings are men.
∴ All kings are mortal.

Characteristics of Syllogism :—

A Syllogism, therefore, presents the following characteristics, which distinguish it from other kinds of inference:

(*a*) The conclusion follows from two premises jointly.

(*a*) *Firstly, the conclusion of a Syllogism follows from the two premises taken jointly* and not from any one of them, by itself. The conclusion is not merely the sum of the two premises but follows from them taken together, as a necessary consequence. In the example given above, the conclusion 'All kings are mortal' is drawn not from any of the two premises singly but it follows from them conjointly.

This characteristic *distinguishes Syllogism from Immediate Inference*, on the one hand, and on the other hand, from *other forms of mediate inference*, in which the premises consist of more than two propositions.

(*b*) The conclusion cannot be more general than the premises.

(*b*) *Secondly, the conclusion of a Syllogism cannot be more general than the premises.* Syllogism is a form of *deductive inference*, and in no form of Deductive Inference, can the conclusion be more general than the given premises.

In the example given above, the conclusion, 'All kings are mortal,' is obviously less general than the premise, 'All men are mortal'—which is applicable to a much larger number of individuals.

This characteristic *distinguishes Syllogism* (*as also other forms of deductive inference*) *from Induction*, in which the conclusion is always more general than the premises.

(*c*) *Thirdly, the conclusion is true, provided the given propositions are true.*

(*c*) The premises are assumed to be true and the conclusion is true provided the given premises are true.

In a Syllogism, as in other forms of deductive inference, we are not concerned with the question as to whether the premises, *i.e.*, the given propositions are, as a matter of fact, true or false. The only question is, granting the premises to be true, the conclusion must necessarily be true. In Deductive forms of inference, the truth of the premises is taken for granted and hence, it is clear that the *truth of the conclusion depends on the truth of the premises, which are presumed to be true.* In other words, Syllogism being a deductive form of inference is concerned with Formal Truth only and not with Material Truth.

Sec. 2. Structure of Syllogism.

A Syllogism consists of *three propositions,* viz., two given propositions and the proposition, which is inferred from the given propositions. The inferred proposition is called the *Conclusion,* and the two given propositions, from which the conclusion is drawn, are called the *Premises.*

Three propositions.

Each proposition consists of two terms. Therefore, a Syllogism, which consists of three propositions, should consist of six terms. On an examination of a Syllogism, however, we find that it consists, not of six different terms but of *three terms, each of which occurs twice.*

Three terms.

These three different terms, each of which occurs wice, have different names given to them. The predicate of the conclusion is called the **Major Term;** he subject of the conclusion is called the **Minor Term;** and that term which occurs in both the premises, but does not occur in the conclusion, is called the **Middle Term.** The Major and Minor terms are called *Extremes,* to distinguish them from the Middle term.

The function of the middle term.

The **Middle Term** occurs in both the premises and is the common element between them. The conclusion seeks to establish a relation between the Extremes —the major term and the minor term—which, to begin with, are, as it were, strangers to each other. The middle term performs the function of an intermediary, a person who, as it were, is known to both these strangers and brings about an introduction between these strangers. But for this common friend, the major term and the minor term would remain strangers to each other for all time. Thus, in the major premise, the major term is compared with the middle term, and in the minor premise, the minor term is compared with the middle term and in this way, ultimately in the conclusion, a relation is established between the major term and the minor term. The middle term is thus "middle" in the sense that it is a mediating term, or a common standard of reference, with which two other terms are compared, and is thus the means by which we pass from premises to conclusion. The middle term having performed its function of bringing the extremes together, drops out from the conclusion. Thus, we reach the conclusion in a Syllogism, not directly or immediately but by means of the middle term.

Premises of a Syllogism.

As to the Premises or the given propositions, the premise in which the major term occurs is called the **Major Premise;** and the premise in which the minor term occurs is called the **Minor Premise.** For example, in the following Syllogism,

All men are mortal.
All kings are men.
∴ All kings are mortal.

The term 'mortal' is the major term, being the predicate of the conclusion; the term 'kings' is the minor term, because, it is the subject of the conclusion; the term 'men' which occurs in both the premises but is absent from the conclusion, is the middle term. The first premise 'All men are mortal' is the major premise, because, the major term 'mortal' occurs in it; the second premise 'All kings are men' is the minor premise, because the minor term 'kings' occurs in it.)

Different ways of describing the Major Premise and the

It may be pointed out that when a Syllogism is given in its strict logical form, the major premise is given first, the minor premise comes next and last of all comes the conclusion. Thus, the MAJOR PREMISE may be described in the following ways :—

(*i*) The major premise is that premise, in which the major term occurs;
(*ii*) The major premise is that premise, in which the major term is compared with the middle term; and
(*iii*) The major premise is that premise, which is given first in a regular form of Syllogism.

Minor Premise.

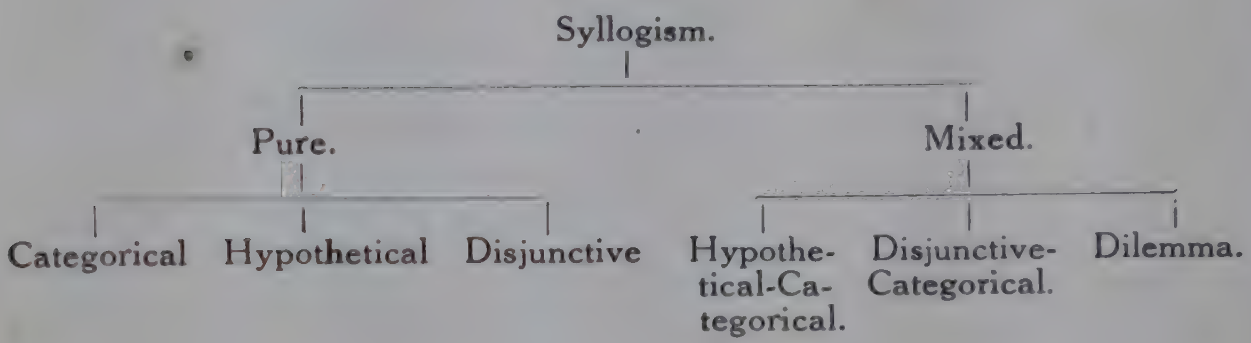
Similarly, the MINOR PREMISE may be described in the following ways :—

(*i*) The minor premise is that, in which the minor term occurs;
(*ii*) The minor premise is that, in which the minor term is compared with the middle term; and lastly,
(*iii*) The minor premise is that, which comes after the major premise, in a syllogism, given in logical form.

It may be noted that the symbol **M** stands for the Middle term, **S** stands for the Minor term and **P** stands for the Major term.

Sec. 3. Kinds of Syllogism.

The following **Table** shows the different kinds of Syllogism:


Syllogism.
Pure.
Mixed.
Categorical
Hypothetical
Disjunctive
Hypothetical-Categorical.
Disjunctive-Categorical.
Dilemma.

Pure and Mixed Syllogisms.

Syllogisms have been classified into Pure and Mixed. In a **Pure Syllogism,** all the constituent propositions are *of the same relation.* If all of them are categorical, the syllogism is **Pure Categorical;** if all hypothetical, the syllogism is **Pure Hypothetical;** and lastly, if all of them are disjunctive, the syllogism is **Pure Disjunctive.**

Three Subdivisions of Mixed Syllogism.

In a **Mixed Syllogism,** on the other hand, the constituent propositions are of different relations. Mixed Syllogisms are of three kinds:

(*i*) **Hypothetical-Categorical.** Here the major premise is hypothetical, the minor is categorical and the conclusion is categorical.

(*ii*) **Disjunctive-Categorical.** Here the major premise is disjunctive, the minor is categorical and the conclusion is categorical; and lastly,

(*iii*) **Dilemma.** In this case, the major premise is a compound hypothetical, the minor premise is disjunctive and the conclusion, either categorical or disjunctive.

Sec. 4. Canons or Fundamental principles of Pure Syllogism.

Syllogism is based on certain fundamental principles or axioms, which form the very foundation of this mode of inference. These self-evident principles are also called Canons of Syllogism and they may be stated as follows :—

Canon 1. Two terms agreeing with one and the same term, agree with each other.

For example : the terms 'Cheapest metal' and 'most useful metal' may be both said to agree with the term 'Iron.' Therefore, they will agree with each other. Thus :—

Iron is the cheapest metal.
Iron is the most useful metal.
∴ The cheapest metal is the most useful metal.

In this example the agreement consists in complete identity, but sometimes, the agreement may be less complete. Socrates is a man and Man is mortal. Here the terms 'Socrates' and 'Mortal,' both agree with the term 'Man,' and therefore, they will agree with each other. Thus :—

All men are mortal.
Socrates is a man.
∴ Socrates is mortal.

Canon 2. Two terms of which one agrees and the other does not agree, with one and the same third term, do not agree with each other.

For example : The term "Socrates" agrees with the term "Man" but the term "immortal" does not agree with the term "Man." Hence, the terms "Socrates" and "immortal" ~~with~~ will not agree with each other. Thus :—

No man is immortal.
Socrates is a man.
∴ Socrates is not immortal.

This leads us to the consideration of the famous principle of Artistotle called by him *Dictum de Omni et Nullo.*

Sec. 5. Aristotle's Dictum de omni et nullo.

Aristotle's *Dictum.*

This dictum or principle which was first enunciated by **Aristotle,** literally means—*Statement concerning all and none.* This principle may be stated thus:—

Statement concerning all and none.

Whatever is predicated, whether affirmatively or negatively, of a term distributed, may be predicated, in like manner, of everything contained under it.

What is true of a certain class, taken distributively, is true of every member of the class and what is not true of a class, taken distributively, is not true of any member of the class.

For example: Whatever is true of all men must be true of Socrates, Plato or any other individual human being; and again, whatever is not true of all men, cannot be true of Socrates, Plato or any other person. If the attribute 'mortality' is true of all men, then it is certainly true of any particular individual. Again, if the attribute 'perfection' does not belong to any man, it cannot belong to Socrates or any other particular individual.

Dictum directly applicable only to the 1st Figure.

This dictum *directly applies to syllogisms of the first figure* only and cannot be directly applied to syllogisms of the other figures. Hence Aristotle regarded the first figure as the *Perfect figure* and other figures as *Imperfect figures.* Aristotle recognised only the 1st, 2nd and 3rd figures, while the 4th figure was subsequently introduced by **Galen.** From Aristotle's point of view, the 2nd, 3rd as well as the 4th figure should be described as Imperfect, because the Dictum does not directly apply to any one of them.

Sec. 6. Lambert's Canons.

Aristotle considered the First figure to be the Perfect figure, because, the *Dictum de omni et nullo* was directly applicable to it, and the other figures were called Imperfect, because, the Dictum was not directly applicable to them. There are some logicians, however, (*e.g.*, LAMBERT) who consider that all the four figures are equally fundamental and each of them is based on a special Dictum. Besides Aristotle's Dictum, Lambert recognised the following three principles, which according to him, formed the basis of the 2nd, 3rd and 4th figures respectively :—

essential

DICTUM DE DIVERSO. "If one term is contained in, and another excluded from, a third term, they are mutually excluded."

DICTUM DE EXEMPLO. "Two terms which contain a common part, partly agree ; or if one contains a part which the other does not, they partly differ."

DICTUM DE RECIPROCO. It has been stated by WELTON thus : "Whatever has a predicate affirmed, or universally denied, of it, may itself be predicated, particularly and with like quality, of any thing which is affirmed of that predicate ; and whatever has a predicate universally affirmed of it may itself be universally denied of any thing which is universally denied of that predicate."

Sec. 7. General Rules of Categorical Syllogism and their violations leading to Fallacies.

Three terms.

Rule 1. Every syllogism must contain three, and only three, terms.

This is hardly a rule of syllogistic inference—it is rather a rule to decide *whether we have a syllogism at all.* A syllogism, as we have seen, consists of three terms, the major term, the minor term and the middle term, each of which occurs twice.

Note. Fallacy of Four Terms and the Fallacy of Equivocation.

Fallacy of Four Terms.

A violation of this rule gives rise to an error or fallacy, known as *the fallacy of four terms.* This fallacy has been nicknamed "*the logical quadruped.*" For examples :

(*a*) All men are mortal.
All horses are quadrupeds.

It is obvious that no conclusion can follow from these two premises.

(*b*) My arm touches the table.
The table touches the floor.
∴ My arm touches the floor.

Here there are four terms, *viz.*, "My arm," "that which touches the table," "The table," and "that which touches the floor." Hence no conclusion can follow.

(*c*) "We are dependent on our motor cars ; and our motor cars are dependent on our chauffeur, so of course we are dependent on our chauffeur." *Bernard Shaw—Man and Superman*—Act IV.

Fallacy of Equivocation.

The real significance of this rule, however, is that it forbids all ambiguity in the case of terms employed in the syllogism. If any one of the three terms in a syllogism be ambiguous, we commit *the fallacy of Equivocation.* An ambiguous word, is really equivalent to as many terms as there are meanings attached to it. What appears to be the major term may be ambiguous, what appears to be the minor term may be ambiguous what appears to be the middle term may be ambiguous, thus giving rise to the three kinds of fallacy of Equivocation, *viz.*, the fallacies of *Ambiguous Major*, *Ambiguous Minor*, and *Ambiguous Middle* respectively. Examples :—

A.—Ambiguous Major.

Ambiguous major.

(*a*) No courageous creature *flies*.
The eagle is a courageous creature.
∴ The eagle does not *fly*.

This involves the fallacy of Ambiguous Major, because the word 'fly' which appears to be the major term is used in the major premise to mean 'runs away out of fear, while in the conclusion, it means 'flying in the air as birds do.'

(*b*) *Light* is essential to guide our steps.
Lead is not essential to guide our steps.
∴ Lead is not *light*.

[In the major premise, 'light' is opposed to 'darkness,' in the conclusion it is opposed to 'heavy.']

B.—Ambiguous Minor.

Ambiguous minor.

(*a*) No man is made of paper.
All *pages* are men.
∴ No *pages* are made of paper.

This involves the fallacy of Ambiguous minor because the word 'page' which appears to be the minor term is used in the minor premise to mean 'boy servant' while in the conclusion it means 'pages of a book.

(*b*) Infantry is not a part of the human body.
Foot is infantry.
∴ *Foot* is not a part of the human body.

C.—Ambiguous Middle.

Ambiguous middle.

(*a*) All *criminal actions* ought to be punished by law.
Prosecutions for theft are *criminal actions*.
∴ Prosecutions for theft ought to be punished by law.

[The apparent middle term 'criminal actions' means 'criminal acts' or 'crimes' in the major premise, while in the minor premise, it means 'criminal cases.']

(*b*) Sound travels at 1,120 feet per second.
His knowledge of law is *sound*.
∴ His knowledge of law travels 1,120 feet per second.

(*c*) All *Masters of Art* are learned men.
This thief is indeed a *master of his art*.
∴ This thief is a learned man.

(*d*) All *cold* is dispelled by heat.
His ailment is *cold*.
∴ His ailment can be dispelled by heat.

[Confusing a cold or catarrh with absence of heat.]

(*e*) All *beggars* are punishable by law.
Sisters of Charity *beg* for subscription.
∴ Sisters of Charity are punishable by law.

Three propositions.

Rule 2. A syllogism must consist of three, and only three, propositions.

This rule also is not a rule of syllogistic inference, but a rule for deciding *whether we have a syllogism at all.* The very definition of the syllogism secures this rule directly and nothing more need be said about this matter.

The middle term must be distributed at least once.

Rule 3. The middle term must be distributed at least once in the premises.

It is absolutely necessary that the middle term should be distributed in one, at least, of the two premises; otherwise, how should we know that there exists a common element necessary to establish a relation between the two extremes? Unless the extremes are related to one and the same part of the middle term, there cannot be a relation between the extremes. The middle term is the bond of connection, but if one part of the middle term be compared with the major term, and a different part with the minor term, no conclusion is possible. For example, the propositions,

All men are mortal.
All dogs are mortal.

cannot lead to any conclusion.

Fallacy of Undistributed Middle.

Note. Fallacy of Undistributed Middle.

The violation of this rule gives rise to *the fallacy of Undistributed Middle* of which, we may give the following examples :—

(*a*) All persons to be admitted to the entertainments are *prize winners.*
John is a *prize winner.*
∴ John is to be admitted to the entertainment.

This argument involves the fallacy of Undistributed Middle because the middle term 'prize winners' has not been distributed even once in the premises.

(*b*) All verbal propositions are *self-evident.*
All axioms are *self-evident.*
∴ All axioms are verbal propositions.

(*c*) All men are *mortal.*
All animals are *mortal.*
∴ All animals are men.

(*d*) All horses are *quadrupeds.*
All dogs are *quadrupeds.*
∴ All dogs are horses.

(*e*) All material bodies are *extended.*
Shadows are *extended.*
∴ Shadows are material bodies.

(*f*) Some *men* are kings.
All cooking animals are *men.*
∴ All cooking animals are kings.

(*g*) All matter *gravitates.*
Air *gravitates.*
∴ Air is matter.

(*h*) All honest men *attend to their business.*
This person *attends to his business.*
∴ This person is honest.

(*i*) All virtuous persons are *happy.*
All rich men are *happy.*
∴ All rich men are virtuous.

(*j*) Solon was really fitted to rule, for he was wise and it is only wise men, who are fitted to rule. Reduced to logical form, it stands thus :—

All persons who are fitted to rule are *wise men.*
Solon was a *wise man.*
∴ Solon was fitted to rule.

(*k*) All planets are *round.*
A wheel is *round.*
∴ A wheel is a planet.

Rule 4. No term can be distributed in the conclusion, unless it is distributed in the premise.

There should not be any improper distribution of terms.

The Syllogism is a form of *deductive* inference, and as such, the conclusion cannot be more general than the premises. Hence, a term which was not taken

in its entire denotation in the premise, cannot be take
in its entire denotation in the conclusion.

Fallacies :

Note. The Fallacies of Illicit Major and Illici Minor.

The violation of this rule gives rise to the **Fallacy** **Illicit Process.** If the major term be distributed in the con clusion, without being distributed in the major premise, w commit the **Fallacy of Illicit Major.** If, on the other han the minor term is distributed in the conclusion, without bein distributed in the minor premise, the fallacy is called th **Fallacy of Illicit Minor.** Examples :—

Illicit Major ;

A.—Fallacy of Illicit Major.

(*a*) All cows are *quadrupeds.*
No dogs are cows.
∴ No dogs are *quadrupeds.*

This argument involves the fallacy of Illicit Major, becaus the major term 'Quadruped' has been distributed in the con clusion without being distributed in the major premise.

(*b*) Whatever, thinks, *exists.*
Matter does not think.
∴ Matter *does not exist.*

(*c*) All Hindus are *Aryans.*
No Persians are Hindus.
∴ No Persians are *Aryans.*

(*d*) All rational agents are *accountable.*
No brutes are rational agents.
∴ No brutes are *accountable.*

(*e*) All straightforward persons are *honest.*
John is not straightforward.
∴ John is not *honest.*

(*f*) All persons nominated for executive service under the Government are the *best graduates of the University.*
Jones has not been so nominated.
∴ Jones is not one of the *best graduates of the University.*

Illicit Minor.

B.—Fallacy of Illicit Minor.

(*a*) No men are perfect.
All men are *animals.*
∴ No *animals* are perfect.

This argument involves the fallacy of Illicit Minor because the minor term 'animal' has been distributed in the conclusion without being distributed in the minor premise.

(*b*) All material bodies have weight.
All material bodies are *extended.*
∴ All *extended things* have weight.

(*c*) All men are mortal.
All men are *rational.*
∴ All *rational* beings are mortal.

(*d*) All metals conduct heat and electricity.
All metals are *elements.*
∴ All *elements* conduct heat and electricity.

Rule 5. From two negative premises, no conclusion can be drawn.

Two negative premises do not yield any conclusion.

Proof. A negative proposition states that the predicate is denied of the subject, and if both the premises be negative, it means that neither the major term nor the minor term is connected with the middle term. If the middle term be not connected with either the major term or the minor term, there is really no common bond between them. It is only when at least one of the extremes is connected with the middle term that we can, through that connection, infer its agreement with or separation from the other extreme. For example, from the following two propositions—

No men are quadrupeds,
No quadrupeds are rational,

no conclusion can be drawn.

Note. Fallacy of Negative Premises.

Fallacy of Negative Premises.

A violation of this rule leads of the **Fallacy of Negative Premises** as in the example given above. In order that a conclusion may be drawn at least one of the premises must be affirmative. For example :

No Scotsman is able to see the force of a joke.
He is not able to see the force of a joke.
∴ He is a Scotsman.

This involves *the fallacy of Negative premises*, because both premises are negative.

A negative premise necessitates a negative conclusion

Rule 6. If one premise be negative, the conclusion must be negative and vice versa, i.e., to prove a negative conclusion one of the premises must be negative.

Proof. Rule 5 says both the premises cannot be negative; hence at least, one of the premises must be affirmative in order that a conclusion can be drawn. Rule 6 says, if one of the premises be negative, the conclusion must be negative. The negative premise merely expresses that there is no connection between the middle term and one of the extremes and the other premise, which must be affirmative, says there is some connection between the middle term and the other extreme. From this, all that we can infer is that there is no connection between the extremes.

and *vice versa.*

The converse of this rule, *viz., to prove a negative conclusion, one of the premises must be negative*, is also true. If the conclusion be negative, it means that there is no connection between the extremes. This can only be proved if we have a negative premise showing that there is no connection between the middle term and one of the extremes and an affirmative premise showing that there is some connection between the middle term and the other extreme.

Two affirmative premises necessitate an affirmative conclusion and

Rule 7. If both the premises be affirmative, the conclusion is affirmative; and vice versa, i.e., if the conclusion be affirmative, both the premises must be affirmative.

Proof. If both the premises be affirmative, it means that the middle term has a connection with both the extremes, and from this, we can only infer that the xtremes themselves have some connection with each ther.

Conversely, *if the conclusion be affirmative, both he premises must be affirmative.* If both the premises e not affirmative, they can either be both negative or ne of them may be negative and the other affirmative. f both be negative, no conclusion follows and if either f the two premises be negative, the conclusion must e negative. Hence the conclusion can be affirmative, nly if both the premises be affirmative.

vice versa.

Rule 8. If both the premises be particular, nothing can be inferred.

Two particular premises do not yield any conclusion.

Proof. This rule may be proved in the following way.

If both the premises be particular, the possible combinations are II, IO, OI, and OO. Let us examine them one by one.

II does not yield any conclusion, because, an I proposition does not distribute either the subject or the predicate, and hence, if both premises are I propositions, no term is distributed in the two premises. But according to Rule 3, the middle term must be distributed at least once in the premises. Hence, if both the premises be I propositions, no conclusion follows.

IO and OI: If one premise be an I proposition and the other premise be an O proposition, the two premises, between them, distribute only one term, and this term must be the middle term, to avoid the fallacy of Undistributed Middle. But one premise being negative, the conclusion must be negative, with the result that the major term, *i.e.*, the predicate of the conclusion, would be distributed in the conclusion, without being distributed in the major premise. Hence in attempting to draw a conclusion, we either commit the fallacy of Undistributed Middle or the fallacy of Illicit Major.

OO: Both being negative, no conclusion can be drawn, according to Rule 5.

Thus, two particular premises yield no conclusion.

Rule 9. If one premise be particular, so is the conclusion.

A particular premise necessitates a particular conclusion.

Proof. This rule may be proved in the following way:

If one premise be particular, the other premise must be universal and therefore, the possible combinations are AI, IA, AO, OA, EI, IE, EO and OE.

Of these eight possible combinations, we may at once reject EO and OE, in which both premises are negative, and as such, no conclusion can be drawn. Let us examine the other combinations one by one.

AI and IA.

If one premise be an A proposition, and the other premise be an I proposition, the two premises between them distribute one term, which must be the middle term, to avoid the fallacy of Undistributed Middle. Hence, no term can be distributed in the conclusion. Therefore, the conclusion, if any, must be an I proposition, which only does not distribute any term. Thus the conclusion is particular.

AO and OA.

If one premise be A, and the other O, between them, they distribute only two terms, *viz.*, the subject of A and the predicate of O. Of these two terms, one must be the middle term. Hence, only one term can be distributed in the conclusion. Now, as one of the premises is negative, the conclusion must be negative and must, therefore, distribute its predicate, the major erm. We have seen, only one term can be distributed n the conclusion and this must be the major term. 'herefore, the minor term is undistributed in the conlusion or in other words, the conclusion is an O proosition, which is particular.

EI and IE.

Between them, the premises distribute two terms —the subject and the predicate of the E proposition.)f course, one must be the middle term and the other, he major term, because, the conclusion being negative vould distribute its predicate, the major term. Hence, he conclusion does not distribute its subject or in other vords, the conclusion, if any, can only be an O proosition which is particular. (In Rule 10, we shall ee that IE cannot lead to any conclusion).

From this rule it is quite evident that *if the conlusion be universal, both the premises must be uniersal because*, if one premise be particular, the concluon must be particular. Hence, a universal conclusion ecessarily presupposes universal premises.

The converse of this rule, viz., if the conclusion e particular, one of the premises must be particular, *not true.* Both the premises may be universal and et we may have a particular conclusion.

ule 10. From a particular major and a negative minor, no conclusion follows.

Proof. If the minor premise be negative, the ajor premise must be affirmative and the conclusion ust be negative. The conclusion being negative, the ajor term is distributed therein, but the major preise, being an affirmative particular, does not distribute ny term. Hence, in attempting to draw a conclusion e commit the fallacy of Illicit Major.

If the major premise be particular and the minor premise be negative, no conclusion follows.

It may be observed that the *last four rules are consequences of the first six rules.* A violation of any of these last four rules is the result of the violation of some of the other rules. Hence, the *first six rules* are called **Primary Rules,** while, *the last four* are called **Secondary Rules.**

To sum up: The first two rules relate to the *structure* of a syllogism; the third and the fourth rules deal with the question of *distribution of terms;* the fifth, sixth and seventh deal with the *Quality* of the constituent propositions; the eighth and ninth deal with the *Quantity* of the constituent propositions; lastly, the tenth rule deals with a *mixed question of quantity and quality.*

Sec. 8. Figure of Syllogism.

Figure of a syllogism is determined by the position of the middle term.

Figure is the form of a syllogism, as determined by the position of the middle term in relation to the extremes, in the premises.

The middle term occurs in both the major and the minor premises, but the position of the middle term is not the same in all syllogisms. There are *four possible arrangements* of the middle term, in the two premises; and, therefore, there are *four figures* of syllogism:

1. First Figure.

In the first figure, the middle term is the subject in the major premise and the predicate in the minor premise; thus,

MP
SM
∴ SP.

2. Second Figure.

In the second figure, the middle term is the predicate in both the premises; thus,

PM
SM
∴ SP.

3. Third Figure.

In the third figure, the middle term is the subject in both the premises; thus,

MP
MS
∴ SP.

4. Fourth Figure.

In the fourth figure, the middle term is the predicate in the major premise and the subject in the minor; thus,

PM
MS
∴ SP.

Sec. 9. Mood of Syllogism.

Mood.

The word **'Mood'** has been used in different senses.

(1) 64 moods, if we take only the *premises.*

Firstly, **'Mood' has been defined as the form of a syllogism, as determined by the quality and the quantity of the constituent premises.**

Now, there are four kinds of propositions, A, E, I and O; and a syllogism has got two premises. Hence, we may have *sixteen* possible moods in each figure; thus:

AA	EA	IA	OA
AE	EE	IE	OE
AI	EI	II	OI
AO	EO	IO	OO

Now, there are four figures—so that in all, we have 16×4=64 possible moods.

Thus, if we take into account the quality and the quantity of the *premises only,* leaving out of account the conclusion, we have 16 moods in each figure and 64 moods in all the four figures.

(2) 256 moods, if we take all the three *propositions.*

Secondly, **the word 'Mood' has been used, in a wider sense, to mean the form of a syllogism, as determined by the quality and the quantity of all the three constituent propositions, taking into account not merely the two premises but also the conclusion.**

Understood in this sense, each of the 64 combinations mentioned above may have four forms. For example, the combination AA in the 1st. figure may have four forms thus:

AAA
AAE
AAI
AAO

Thus, in this sense there are 64×4, *i.e.*, 256 moods, in all the four figures.

(3) 19 *Valid* moods out of 64 possible combinations if we take into account only the premises.

Thirdly, there are some logicians, again, who use the word 'Mood' in a highly restricted sense, to mean only **valid moods, i.e., those combinations which yield valid conclusions.** We shall see, later on, that in this sense, **there are only 19 valid moods in all the four figures, if we take into account the premises only;** *viz.*,

AA, EA, AI, EI—1st figure.
EA, AE, EI, AO—2nd figure.
AA, IA, AI, EA, OA, EI—3rd figure.
AA, AE, IA, EA, EI—4th figure.

It should be noted that out of these nineteen valid moods, the moods EA and EI are common to all the four figures. In other words the moods, **EA and EI yield valid conclusions in all the figures.**

If, however, we take into account all the three constituent propositions, there are 24 valid moods; thus:

AAA AAI EAE EAO AII EIO—1st figure.
EAE EAO AEE AEO EIO AOO—2nd figure.
AAI IAI AII EAO OAO EIO—3rd figure.
AAI AEE AEO IAI EAO EIO—4th figure.

It should be noted that the moods **EAO and EIO are valid in all the four figures.**

How valid moods are to be determined will be clear in the next section.

Sec. 10. Determination of Valid Moods.

We have seen that if by 'Mood' we understand the form of a syllogism, as determined by the quality and quantity of the *premises*, there are *sixteen moods in each figure*; thus:

AA A EA E IA I OA O
AE E EE IE OE
AI I EI O II OI
AO O EO IO OO

If we consider premises only, there are 16 possible moods in each figure, of which eight do not yield any conclusion in any figure.

Of these sixteen possible moods, **EE, EO, OE** and **OO** do not yield any conclusion in any figure, because both the premises are negative. Again, **II, IO** and **OI** do not yield any valid conclusion in any figure, because, both the premises are particular. Lastly, **IE,** the major premise of which is particular and the minor premise of which is negative, cannot yield any valid conclusion in any figure, according to Rule 10. Thus, *of the sixteen possible moods, eight do not yield any conclusion in any figure.*

Remaining eight moods.

Let us now see what conclusions the remaining eight combinations, *viz.*, AA, AE, AI, AO, EA, EI, IA and OA, lead to and which of them yield valid conclusions, and which do not, in each figure.

First Figure.

I. Valid Moods of the First Figure.

In the first figure, the middle term is the subject in the major premise, and the predicate in the minor premise.

AAA. (Barbara).

(1) **AA.** A. All M is P — All men are mortal.
A. All S is M — All kings are men.
∴ A. All S is P — ∴ All kings are mortal.

Here, both the premises are affirmative, therefore, the conclusion, if any, must be affirmative. The middle term is distributed in the major premise. By drawing an A proposition in the conclusion, we do not violate any of the rules of syllogism, because, the minor term which is distributed in the conclusion is also distributed in the minor premise. Hence, AA gives A as its conclusion, in the first figure. This valid mood is called **Barbara.**

AE. (no conclusion).

(2) **AE.** A. All M is P.
E. No S is M.

No conclusion follows, because, the conclusion, if any, must be negative and as such, the major term P, which is not distributed in the major premise, will be distributed in the conclusion. Hence, AE is not a valid mood in the first figure.

AII. (Darii).

(3) **AI.** A. All M is P. — All men are rational.
I. Some S is M. — Some animals are men.
∴ I. Some S is P. — ∴ Some animals are rational.

Here, as both the premises are affirmative, and one premise is particular, the conclusion must be a particular affirmative, *i.e.*, an I proposition. The middle term is distributed in the major premise and no term is distributed in the conclusion. Hence, AI gives I as its conclusion in the first figure. This valid mood is called **Darii.**

AO. (no conclusion).

(4) **AO.** A. All M is P.
O. Some S is not M.

From this combination no conclusion follows in the first figure. As one premise is negative, the conclusion, if any, should also be negative, distributing its predicate, the major term. But the major term is not distributed in the major premise. Hence AO is not a valid mood in the first figure.

(5) **EA.**	E. No M is P.	No animals are immortal.	EAE. (Celarent).
	A. All S is M.	All men are animals.	
	∴ E. No S is P.	∴ No men are immortal.	

In this case, one of the propositions being negative, the conclusion must be negative. If we draw an E proposition in the conclusion we do not violate any of the rules of syllogism, because the middle term is distributed in the major premise, and the major and minor terms which are distributed in the conclusion, are also distributed in their respective premises. Thus, EA yields E as its conclusion in the first figure. This valid mood is called **Celarent.**

(6) **EI.**	E. No M is P.	No quadrupeds are men.	EIO. (Ferio).
	I. Some S is M.	Some animals are quadrupeds.	
	∴ O. Some S is not P.	∴ Some animals are not men.	

One premise being negative and another being particular, the conclusion, if any, must be a particular negative, *i.e.*, O. In drawing an O proposition in the conclusion we do not violate any of the rules of syllogism, because the middle term is distributed in the major premise and the major term, which is distributed in the conclusion, is also distributed in the major premise. Thus, EI gives O as its conclusion, in the first figure. This valid mood is called **Ferio.**

(7) **IA.**	I. Some M is P.	IA. (no conclusion).
	A. All S is M.	

No conclusion follows, because, the middle term is not distributed in either of the premises. Thus IA is not a valid mood in the first figure.

OA. (no conclusion).

(8) **OA.** O. Some M is not P.
A. All S is M.

No conclusion follows because, the middle term is not distributed even once in the premises. Thus OA is not a valid mood in the first figure.

Thus, in the first figure, only four combinations yield valid conclusions, viz., **AA (Barbara), EA (Celarent), AI (Darii)** and **EI (Ferio).**

Note 1. The Special Rules of the first figure are the following:—

1. The major premise must be universal.
2. The minor premise must be affirmative.

Rule 1.—*The major premise must be universal.*

Proof.—If the major premise be not universal, it must be particular. In the first figure, the middle term is the subject in the major premise, which being assumed to be particular, does not distribute the middle term. The middle term, however, must be distributed at least once, in the premises, and if it is not distributed in the major premise, it must be distributed in the minor premise. In the first figure, the middle term is the predicate in the minor premise, and if it is to be distributed therein, the minor premise must be negative, because only negative propositions distribute their predicates. If the minor premise be negative, the conclusion must be negative and the major premise must be affirmative.

We have assumed that the major premise is particular and we now find that it must be affirmative. The major premise, being a particular affirmative proposition, does not distribute the major term, which, however, in a negative conclusion, is distributed. Thus, if we assume that the major premise is particular, we are driven to the fallacy of Illicit Major. Therefore, the major premise is not particular, it must be universal.

RULE 2.—*The minor premise must be affirmative.*

Proof. If the minor premise be not affirmative, it is negative. If the minor premise be negative, the conclusion must be negative and the major premise must be affirmative. In the first figure, the major term is the predicate in the major premise, which being affirmative, the major term is not distributed therein. But the conclusion being negative, the major term will be distributed in the conclusion. Thus, the supposition that the minor premise is negative leads to the fallacy of Illicit Major. Therefore, the minor premise must be affirmative.

Note 2. Special characteristics of the first figure.

The first figure presents the following distinctive characteristics :—

(*i*) The *Dictum de omni et nullo* applies directly only to the first figure. Hence, this figure was called by Aristotle, the *Perfect Figure.*

(*ii*) The first figure is the only figure which has an *A proposition* as its conclusion.

(*iii*) The first figure is the only figure which proves all the *four kinds of propositions,* viz., A.E.I.O.

(*iv*) In the first figure, *neither does the major nor the minor term suffer a change of position,* for the minor term is the subject and the major term is the predicate both in the premise and in the conclusion.

II. Valid Moods of the Second Figure.

Second Figure

In the second figure, the middle term is the predicate in both premises. Now, let us examine the eight combinations, one by one.

(1) **AA.** A. All P is M.
A. All S is M.

AA. (no conclusion).

No conclusion follows, because, the middle term is not distributed even once, in the premises. Thus, AA does not yield any valid conclusion, in the second figure.

AEE.
(Camestres).

(2) **AE.**	A. All P is M.	All metals are elements.
	E. No S is M.	No compounds are elements.
	∴ E. No S is P.	∴ No compounds are metals.

One premise being negative, the conclusion must be negative. If we draw an E proposition in the conclusion, no syllogistic rule is violated, because, the middle term is distributed in the minor premise and the major and the minor terms, which are distributed in the conclusion, are also distributed in their respective premises. Thus, AE gives E as its conclusion, in the second figure. This valid mood is called **Camestres.**

AI.
(no conclusion).

(3) **AI.** A. All P is M.
I. Some S is M.

No conclusion follows, because, the middle term is undistributed in both the premises. Hence AI does not yield any valid conclusion, in the second figure.

AOO.
(Baroco).

(4) **AO.**	A. All P is M.	All horses are quadrupeds.
	O. Some S is not M.	Some animals are not quadrupeds.
	∴ O. Some S is not P.	∴ Some animals are not horses.

One premise being both particular and negative, the conclusion, if any, must be also particular and negative. In drawing an O proposition as the conclusion, we do not violate any of the rules of syllogism, because the middle term is distributed in the minor premise and the major term which is distributed in the conclusion is also distributed in the major premise. Hence, AO gives O as its conclusion, in the second figure. This valid mood is called **Baroco.**

(5) **EA.** E. No P is M. No perfect beings are mortal. EAE. (Cesare).
A. All S is M. All men are mortal.
∴ E. No S is P. ∴ No men are perfect beings.

The conclusion must be negative, because one premise is negative. In drawing an E proposition in the conclusion, we do not violate any of the rules of syllogism, because the middle term is distributed in the major premise, and the major and the minor terms which are distributed in the conclusion, are also distributed in the respective premises. Thus EA gives E, as its conclusion in the second figure. This valid mood is called **Cesare.**

(6) **EI.** E. No P is M. No men are perfect. EIO. (Festino).
I. Some S is M. Some beings are perfect.
∴ O. Some S is not P. ∴ Some beings are not men.

One premise is negative and the other premise is particular. Therefore, the conclusion, if any, must be O. In drawing an O proposition, as the conclusion, we do not violate any of the rules of syllogism, because the middle term is distributed in the major premise, and the major term, which is distributed in the conclusion, is also distributed in the major premise. Therefore, EI gives O in the second figure. This valid mood is called **Festino.**

(7) **IA.** I. Some P is M. IA. (no conclusion).
A. All S is M.

The middle term being undistributed in both the premises no conclusion follows.

(8) **OA.** O. Some P is not M. OA. (no conclusion).
A. All S is M.

The conclusion, if any, must be particular and negative, because one premise is particular and negative. The negative conclusion will distribute its predicate, the major term, which, however, is not distributed in the major premise. Hence no conclusion follows from OA in the second figure.

Thus in the second figure, only four combinations yield valid conclusions, *viz.*, **EA (Cesare), AE (Camestres), EI (Festino)** and **AO (Baroco).**

Note. The Special Rules of the second figure are the following:—

1. The major premise must be universal.
2. One of the premises must be negative.

RULE 1.—*The major premise must be universal.*

Proof.—If the major premise be not universal, it is particular. In the second figure, the major term is the subject in the major premise. The major premise being particular, the major term is undistributed in the premise and cannot be distributed in the conclusion, in which it is the predicate. The conclusion, therefore, must be an affirmative proposition, because, only affirmative propositions do not distribute their predicate. The conclusion being affirmative, both the premises must be affirmative with the result that their predicates are undistributed. In the second figure, the middle term is predicate in both the premises and therefore is not distributed even once.

Thus, the supposition, that the major premise is particular, leads to the Fallacy of Undistributed Middle. Therefore, the major premise must be universal.

RULE 2.—*One of the premises must be negative.*

Proof.—In the second figure the middle term is the predicate in both the premises. Now, affirmative propositions do not distribute their predicates but the middle term must be distributed at least once. Therefore, there must be a negative premise.

III. Valid Moods of the Third Figure.

In the third figure, the middle term is the subject n both the premises.

1) **AA.** A. All M is P. All men are rational.
A. All M is S. All men are mortal.
∴ I. Some S is P. ∴ Some mortals are rational.

AAI.
(Darapti).

Both premises being affirmative, the conclusion must be affirmative. If we draw an A proposition in he conclusion, we shall have to distribute the minor erm therein, though it is undistributed in the minor premise. Hence an A proposition cannot be the conclusion in this case. But, if we draw an I proposition, no rule of syllogism is violated, because, the middle erm is distributed in both the premises and there is no improper distribution of terms in the conclusion. Thus, AA gives I as its conclusion, in the third figure. This valid mood is called **Darapti.**

2) **AE.** A. All M is P.
E. No M is S.

AE.
(no conclusion).

No conclusion follows, because, the conclusion, if any, must be negative, one premise being negative. The negative conclusion would distribute its predicate, he major term, which, however, is not distributed in he major premise.

3) **AI.** A. All M is P. All diseases are painful.
I. Some M is S. Some diseases are preventible.
∴ I. Some S is P. ∴ Some preventible things are painful.

AII.
(Datisi).

One premise being particular and both premises eing affirmative, the conclusion, if any, must be I. n drawing an I proposition, no rule is violated, ecause the middle term is distributed in the major premise and there is no improper distribution of terms in the conclusion. Thus, AI gives I as its conclusion, in the third figure. This valid mood is called **Datisi.**

AO.
(no conclusion).

(4) **AO.** A. All M is P.
O. Some M is not S.

No conclusion follows, because, if there be a conclusion, it must be negative, distributing its predicate, the major term, which, however, is not distributed in the major premise.

EAO.
(Felapton).

(5) **EA.**		
	E. No M is P.	No men are perfect.
	A. All M is S.	All men are rational.
	∴ O. Some S is not P.	∴ Some rational beings are not perfect.

One premise being negative, the conclusion must be negative. If, however, we draw an E proposition in the conclusion, we would be distributing the minor term in the conclusion, without distributing it in the minor premise. But if we draw an O proposition in the conclusion, no rule is violated, the middle term being distributed in both the premises and the major term, which is distributed in the conclusion, is also distributed in the major premise. Thus, EA gives O in the third figure. This valid mood is called **Felapton.**

EIO.
(Ferison).

(6) **EI.**		
	E. No M is P.	No aggressive war is justifiable.
	I. Some M is S.	Some aggressive wars are successful.
	∴ O. Some S is not P.	∴ Some successful things are not justifiable.

One premise being negative and another being particular, the conclusion, if any, must be a particular negative. In drawing an O proposition, in the conclusion, no rule of syllogism is violated, because, the middle term is distributed in the major premise and the major term, which is distributed in the conclusion, is also distributed in the major premise. Therefore, EI gives O in the third figure. This valid mood is called **Ferison.**

(7) **IA.** I Some M is P. Some men are wise. IAI.
A. All M is S. All men are mortal. (Disamis).
∴ I. Some S is P. ∴ Some mortals are wise.

One premise being particular and both premises being affirmative, the conclusion, if any, must be I. In drawing an I proposition, in the conclusion, we do not violate any of the syllogistic rules. Therefore, IA gives I in the third figure. This valid mood is called **Disamis.**

(8) **OA.** O. Some M is not P. Some men are not wise. OAO.
A. All M is S. All men are mortal. (Bocardo).
∴ O. Some S is not P. ∴ Some mortals are not wise.

One premise being particular negative, the conclusion must be O. In drawing an O conclusion, no rule of syllogism is violated. Thus, OA gives O in the third figure. This valid mood is called **Bocardo.**

Thus, in the third figure, six combinations yield valid conclusions, *viz.*, **AA (Darapti), IA (Disamis), AI (Datisi), EA (Felapton), OA (Bocardo), EI (Ferison).**

Note. The Special Rules of the third figure are the following:—

1. The minor premise must be affirmative.
2. The conclusion must be particular.

RULE 1.—*The minor premise must be affirmative.*

Proof.—If the minor premise be not affirmative, it must be negative. If the minor premise be negative, the major premise must be affirmative and the conclusion must be negative. Now, in the third figure the major term is the predicate in the major premise. The major premise being affirmative, the major term is undistributed in the premise, but the major term is distributed in the conclusion, because the conclusion is negative. Thus, if we suppose the minor premise to be negative, we commit the fallacy of Illicit Major. Hence, the minor premise must be affirmative.

RULE 2.—*The conclusion must be particular.*

Proof.—In the third figure, the minor term is the predicate in the minor premise. According to special rule 1, the minor premise is affirmative. An affirmative proposition does not distribute its predicate. Therefore, the minor term is undistributed in the minor premise and cannot be distributed in the conclusion. The minor term is the subject of the conclusion and only particular propositions do not distribute their subjects. Therefore, the conclusion must be particular or we commit the fallacy of Illicit Minor.

IV. Valid moods of the Fourth Figure.

In the fourth figure, the middle term is the predicate in the major premise and the subject in the minor premise.

AAI. (Bramantip)	(1) **AA.**	A. All P is M.	All men are animals.
		A. All M is S.	All animals are mortal.
		∴ I. Some S is P.	∴ Some mortals are men.

Both premises being affirmative, the conclusion must be affirmative. If, however, we draw an A proposition, the minor term would be distributed in the conclusion without being distributed in the minor premise. But, if we draw an I proposition, no rule would be violated. Thus, AA gives I in the fourth figure. This valid mood is called **Bramantip.**

AEE. (Camenes).	(2) **AE.**	A. All P is M.	All men are mortal.
		E. No M is S.	No mortals are perfect.
		∴ E. No S is P.	∴ No perfect beings are men.

One premise being negative, the conclusion must be negative. In drawing an E proposition, in the conclusion, no syllogistic rule is violated. Thus, AE gives E, in the fourth figure. This valid mood is called **Camenes.**

(3) **AI.** A. All P is M.
I. Some M is S.

AI.
(no conclusion).

The middle term being undistributed in both the premises no conclusion can be drawn.

(4) **AO.** A. All P is M.
O. Some M is not S.

AO.
(no conclusion).

No conclusion can be drawn, because, the middle term has not been distributed even once in the premises.

(5) **EA.**	E. No P is M.	No quadrupeds are men.
	A. All M is S.	All men are animals.
	∴ O. Some S is not P.	∴ Some animals are not quadrupeds.

EAO.
(Fesapo).

One premise being negative, the conclusion, if any, must be negative. If, however, we draw an E conclusion, we shall have to distribute the minor term which is undistributed in the minor premise. But, if we draw an O proposition in the conclusion, no syllogistic rule is violated. Therefore, EA gives O, in the fourth figure. This valid mood is called **Fesapo.**

(6) **EI.**	E. No P is M.	No man is perfect.
	I. Some M is S.	Some perfect beings are rational beings.
	∴ O. Some S is not P.	∴ Some rational beings are not men.

EIO.
(Fresison).

One premise being negative and the other being particular, the conclusion, if any, must be O. By drawing an O conclusion, we do not violate any syllogistic rule. Therefore, EI gives O in the fourth figure. This valid mood is called **Fresison.**

IAI. (Dimaris).

(7) **IA.** I. Some P is M. Some animals are men.
A. All M is S. All men are mortal.
∴ I. Some S is P. ∴ Some mortals are animals.

One premise being particular and both premises being affirmative, the conclusion must be I. In drawing an I proposition in the conclusion, we do not violate any syllogistic rule. Therefore, IA gives I in the fourth figure. This valid mood is called **Dimaris.**

OA. (no conclusion).

(8) **OA.** O. Some P is not M.
A. All M is S.

No conclusion follows, because, one premise being negative, the conclusion, if any, must be negative, distributing the major term, which is undistributed in the major premise.

Thus, in the fourth figure, five combinations yield valid conclusions, *viz.*, **AA Bramantip), AE (Camenes), IA (Dimaris), EA (Fesapo),** and **EI (Fresison).**

Note. The Special Rules of the fourth figure are the following:—

1. If the major premise be affirmative, the minor must be universal.
2. If the minor premise be affirmative, the conclusion must be particular.
3. If either premise be negative, the major must be universal.

RULE 1.—*If the major premise be affirmative, the minor must be universal.*

In the fourth figure, the middle term is the predicate in the major premise. Therefore if the major premise be affirmative it cannot distribute the middle term. The middle term must therefore be distributed in the minor premise. In the fourth figure, the middle term is subject in the minor premise. Particular propositions do not distribute their subject. Therefore if the middle term is to be distributed in the minor premise, the minor premise must be universal.

RULE 2.—*If the minor premise be affirmative, the conclusion must be particular.*

In the fourth figure, the minor term is the predicate in the minor premise. If the minor premise be affirmative the minor term is undistributed in the premise and cannot be distributed in the conclusion. In the conclusion the minor term is the subject and only particular propositions do not distribute their subjects. Therefore, the conclusion in this case must be particular.

RULE 3.—*If either premise be negative, the major must be universal.*

If either premise be negative, the conclusion must be negative, distributing at least the predicate, *i.e.*, the major term. The major term therefore must be distributed in the major premise. In the fourth figure, the major term is the subject in the major premise and only universal propositions distribute their subjects. Thus the major premise in this case must be universal.

We have seen that if, by Mood, we understand the form of a syllogism, as determined by he quality and quantity of the constituent *premises*, here are 16 possible combinations in each figure and herefore, 64 combinations in all the four figures. **Out of these 64 combinations we find only 19 combinations yield valid conclusions, four in the first, four in the second, six in the third and five in the fourth figure.**

Sec. 11. Reduction : Direct and Indirect.

Reduction, literally, means change or transformaion. There are some logicians who use the word

Reduction
means
transforma-

tion of the moods of the imperfect figures into moods of the perfect figure, thereby, demonstrating their truth.

'Reduction' in a very wide sense, to mean *the transformation of moods of any figure into moods of any other figure.* In this sense, the moods of the first figure may be reduced to the moods of the second figure, the moods of the second figure may be reduced to moods of the third figure, the moods of the third figure may be reduced to moods of the fourth figure and in fact, there may be reduction of any mood into any other mood.

The word 'Reduction' however is generally used in a much more restricted sense. The word is used to mean *the process of transforming moods of the second, third and fourth figures into moods of the first figure.*

The first figure was called by Artistotle, the perfect figure, because, the *Dictum de omni et nullo* was directly applicable to it. The Dictum is not directly applicable to the moods of the second, third and fourth figures, which accordingly are called Imperfect figures. If, however, the moods of the imperfect figures be reduced to moods of the perfect figure, the dictum may be made applicable to them, after such reduction or transformation. Thus, by such transformation, the *imperfection* of the moods of the so-called imperfect figures, is, as it were, removed. In other words, it is proved that though the dictum is not directly applicable to the moods of the so-called imperfect figures, yet, the very fact, that those moods may be reduced to moods of the perfect figure, shows that the conclusions of those moods, like those of the first figure, are also valid. Thus, *the object of Reduction is to prove the correctness of the moods of the second, third and fourth figures.*

Hence **Reduction may be defined as the process of transforming the moods of the imperfect figures into moods of the perfect figure thereby, proving the correctness of the moods of the so-called imperfect figures.**

Reduction is of two kinds:—

Direct Reduction.

(*a*) **Direct** or **Ostensive Reduction,** in which a mood of the imperfect figures is *directly* transformed into a mood of the first or perfect figure, by means of Conversion, Obversion, Contraposition or transposition of premises. It is called *direct,* because the given conclusion is deduced from premises, derived from those in the given syllogism.

Indirect Reduction.

(*b*) **Indirect Reduction,** on the other hand, consists in proving, with the help of the perfect figure, that the contradictories of the conclusions of the moods of the imperfect figures are false and hence, the conclusions must be true.

Note. Is Reduction necessary?

At the time of Aristotle, Reduction was the only means of proving the validity of the moods of the so-called imperfect figures, and as such, it was absolutely necessary at that period. But, at the present day, there are *other modes* of testing the correctness of syllogism, *e.g.*, the application of the general syllogistic rules, the special syllogistic rules etc. Hence, Reduction has not the same importance at the present time as it had at the time of Aristotle. At present, it may be considered as *one of the different methods* and not the sole method of proving the correctness of the moods of the so-called imperfect figures. While recognising that Reduction has lost much of its past importance, it should not be thought that even at the present day it is absolutely useless. On the other hand, Reduction by showing that different forms of syllogistic reasoning are reducible or transformable into one another proves that the various moods inspite of their apparent diversity, are at bottom expressions of one fundamental principle. Thus, *Reduction reveals the essential unity of all forms of syllogistic inference.*

Sec. 12. The Mnemonic Lines.

assumed, imag

The mnemonic lines are composed of fictitious words which contain detailed instructions as to how syllogisms of the second, third and fourth figures can be directly reduced to those of the first figure. We have seen that there are four valid moods in the first figure, four in the second figure, six in the third figure and five in the fourth figure. The first, second, third, and fourth lines given below name the valid moods of the first, second, third and fourth figures respectively.

BARBARA, CELARENT, DARII, FERIO;
CESARE, CAMESTRES, FESTINO, BAROCO;
DARAPTI, DISAMIS, DATISI, FELAPTON, BOCARDO, FERISON;
BRAMANTIP, CAMENES, DIMARIS, FESAPO, FRESISON.

Significant letters.

In each of these words, we find *three* vowels; the first vowel stands for the major premise, the second vowel stands for the minor premise and the third vowel stands for the conclusion. Thus the vowels in the words indicate the moods, *e.g.*, *Barbara* stands for the mood AAA in the first figure; *Celarent* stands for the mood EAE in the first figure, and so on.

The initial letters of the moods of the first figure are the first four consonants, **B, C, D, F.** Except in *Baroco* and *Bocardo*, the initial consonant of the moods f the imperfect figures indicates that the mood is to e reduced to a mood of the first figure, having the ame initial consonant. Thus, B in *Bramantip* indi-ates that it is to be reduced to *Barbara;* C in *Cesare* ndicates that it is to be reduced to *Celarent;* D in *Darapti* indicates that it is to be reduced to *Darii;* F n *Festino* indicates that it is to be reduced to *Ferio;* nd so on.

s denotes Simple Conversion of the proposition indicated by the preceding vowel.

p denotes Conversion *per accidens* of the proposition indicated by the preceding vowel.

Where s or p occurs after the third vowel, *he conclusion of the new syllogism is to be converted, ither simply or per accidens as the case may be.*

m denotes *metathesis, i.e.,* transposition of the premises; *i.e.,* the major premise of the given syllogism becomes the minor premise of the new syllogism in the first figure; and the minor premise of the given syllogism becomes the major premise of the new syllogism in the first figure.

k denotes Obversion of the preceding proposition. Therefore, **ks** means first Obversion, then Simple Conversion, *i.e.,* Contraposition; **sk** means first Simple Conversion, then Obversion. If **sk** occur after the third vowel, it means that the conclusion of the new syllogism is to be converted simply and then obverted.

c shows that the syllogism is to be reduced indirectly. *Baroco* and *Bocardo* are the only two syllogisms, in which, the letter **c** occurs. They were reduced indirectly by older logicians. It is possible, however, to reduce them directly, in which case they would be called **Faksoko** (or *Faksnoko*) and **Doksamosk** (or *Doksamrosk*) *respectively*.

Unmeaning letters.

The letters *r*, *t*, *l*, *b*, *d*, and *n* are meaningless and have been introduced only to help pronounciation.

Sec. 13. Direct Reduction of Imperfect Moods.

1. Moods of the Second Figure.

Cesare.

	(1) Cesare.		**Celarent.**	
E.	No P is M.	s	No M is P.	E.
A.	All S is M.		All S is M.	A.
∴ E.	No S is P.		∴ No S is P.	E.

Camestres.

	(2) Camestres.		**Celarent.**	
A.	All P is M.		No M is S.	E.
E.	No S is M.		All P is M.	A.
∴ E.	No S is P.		∴ No P is S.	E.
			∴ No S is P, by Conversion.	

Festino.

	(3) Festino.		**Ferio.**	
E.	No P is M.	s	No M is P.	E.
I.	Some S is M.		Some S is M.	I.
∴ O.	Some S is not P.		∴ Some S is not P.	O.

Baroco.

	✓ **(4) Baroco = Faksoko.**		**Ferio.**	
A.	All P is M.	ks	No not-M is P.	E.
O.	Some S is not M.	s	Some S is not-M.	I.
∴ O.	Some S is not P.		∴ Some S is not P.	O.

. Moods of the Third Figure.

(1) Darapti.		**Darii.**	Darapti.
A. All M is P.		All M is P.	A.
A. All M is S.	p	Some S is M.	I.
∴ I. Some S is P.		∴ Some S is P.	I.

(2) Disamis.		**Darii.**	Disamis.
I. Some M is P.		All M is S.	A.
A. All M is S.		Some P is M.	I.
∴ I. Some S is P.		∴ Some P is S.	I.
		∴ Some S is P, by Conversion.	

(3) Datisi.		**Darii.**	Datisi.
A. All M is P.		All M is P.	A.
I. Some M is S.	s	Some S is M.	I.
∴ I. Some S is P.		∴ Some S is P.	I.

(4) Felapton.		**Ferio.**	Felapton.
E. No M is P.		No M is P.	E.
A. All M is S.	p	Some S is M.	I.
∴ O. Some S is not P.		∴ Some S is not P.	O.

✓

(5) Bocardo = Doksamosk.		**Darii.**	Bocardo.
O. Some M is not P.		All M is S.	A.
A. All M is S.		Some not-P is M.	I.
∴ O. Some S is not P.		∴ Some not-P is S.	I.
		∴ Some S is not-P, by Conversion.	
		∴ Some S is not P, by Obversion.	

(6) Ferison.		**Ferio.**	Ferison.
E. No M is P.		No M is P.	E.
I. Some M is S.	s	Some S is M.	I.
∴ O. Some S is not P.		∴ Some S is not P.	O.

Bramantip.

3. Moods of the Fourth Figure.

	(1) Bramantip.	Barbara.	
A.	All P is M.	All M is S.	A
A.	All M is S.	All P is M.	A
∴ I.	Some S is P.	∴ All P is S.	A
		∴ Some S is P, by Conversion.	

Camenes.

	(2) Camenes.	Celarent.	
A.	All P is M.	No M is S.	E
E.	No M is S.	All P is M.	A
∴ E.	No S is P.	∴ No P is S.	E
		∴ No S is P, by Conversion.	

Dimaris.

	(3) Dimaris.	Darii.	
I.	Some P is M.	All M is S.	A
A.	All M is S.	Some P is M.	I
∴ I.	Some S is P.	∴ Some P is S.	I
		∴ Some S is P, by Conversion.	

Fesapo.

	(4) Fesapo.		Ferio.	
E.	No P is M.	s	No M is P.	E
A.	All M is S.	p	Some S is M.	I.
∴ O.	Some S is not P.		∴ Some S is not P.	O

Fresison.

	(5) Fresison.		Ferio.	
E.	No P is M.	s	No M is P.	E
I.	Some M is S.	s	Some S is M.	I.
∴ O.	Some S is not P.		∴ Some S is not P.	O

Sec. 14. Indirect Reduction of all Imperfect moods.

In Indirect Reduction, the conclusion of the syllogism

Reduction is indirect when a new syllogism in the first figure is formed, which establishes the validity of the original conclusion, by proving the falsity of its contradictory. If the contradictory of the original conclusion be proved to be false, then the original conclusion is proved to be true. This is also called *Reductio ad Absurdum* (Reduction to absurdity), because it begins with the supposition that the contradictory of the given conclusion is true but ultimately such a supposition is found to be absurd and false. It is also called *Reductio ad Impossibile* (Reduction to impossibility).

is proved to be true, by proving that its contradictory is false.

Indirect Reduction can be applied to any of the imperfect moods, though, originally, it was confined only to *Baroco* and *Bocardo*, as indicated in the Mnemonic lines. Let us take all the imperfect moods one by one.

1. Moods of the Second Figure.

Second Figure Cesare.

(1) Cesare.

E. No P is M.
A. All S is M.
∴ E. No S is P.

If the given conclusion be not true, then, its contradictory, *viz.*, Some S is P (I) must be true. With this proposition, as the *minor* premise, and the original major premise, as the major premise, let us form a new syllogism in the first figure, thus :—

E. No P is M. (Original major).
I. Some S is P. (Contradictory of given conclusion).
∴ O. Some S is not M. (New conclusion).

This is Ferio, a valid mood in the first figure, because P, the middle term, is the subject, in the major premise, and the predicate, in the minor premise.

Now, we find, this new conclusion is the contradictory of the original minor premise, *viz.*, All S is M, which, according to the rules of syllogism, must be taken to be true. Hence, its contradictory, the new conclusion must be false. To what is its falsity due? The falsity can neither be due to the process of reasoning, which is Ferio, nor to the new major premise, which is the same as the original major. Therefore, its falsity is due to the new minor premise, or in other words, the new minor premise is false. Therefore, its contradictory, the original conclusion, is true.

NOTE. In this case, the contradictory of the given conclusion is taken as the minor premise and the major premise is borrowed from the given syllogism. If, on the contrary, the contradictory of the given conclusion had been taken as the major premise and the minor premise had been borrowed from the original syllogism, then we would not have had a valid mood in the first figure. In Indirect Reduction, as well as in Direct Reduction, *the given syllogism must be reduced to a syllogism of the first figure.* Hence, the contradictory of the given conclusion in Indirect Reduction, may be taken to form, either the major or the minor premise, *according as, it along with the other premise borrowed from the given syllogism forms a valid mood in the first figure.* Sometimes, it will be found, the contradictory of the given conclusion may be taken either as the major or the minor premise at pleasure; because, in both cases, joined with the other premise, borrowed from the given syllogism, we get a valid mood in the first figure.

Camestres.

(2) Camestres.

A. All P is M.
E. No S is M.
∴ E. No S is P.

If the given conclusion be not true, its contradictory 'Some S is P,' must be true. With this proposition as the *minor* premise, and the original major as the major. let us form a new syllogism in the first figure.

A. All P is M.
I. Some S is P.
∴ I. Some S is M, according to Darii—P being the middle term, in the new syllogism.

Now, the new conclusion is the contradictory of the original minor premise, which must be taken to be true. Therefore, the new conclusion is false. To what is its falsity due? It can neither be due to the process of reasoning, which is Darii, nor to the new major premise, which is the same as the given major premise and hence must be taken to be true. Therefore, the falsity of the new conclusion must be due to the falsity of the new minor premise. The new minor premise, being thus proved to be false, its contradictory, the original conclusion, must be taken to be true.

(3) Festino.

Festino.

E. No P is M.
I. Some S is M.
∴ O. Some S is not P.

If the conclusion be not true, its contradictory 'All S is P' must be true. With this as the *minor premise*, and the original major as the major, let us form a new syllogism in the first figure.

E. No P is M.
A. All S is P.
∴ E. No S is M. according to Celarent, P being the middle term.

The new conclusion being the contradictory of the original minor cannot be true. Why is the new conclusion false? Its falsity can neither be due to the process of reasoning, which is Celarent, nor to the new major premise, which is the same as he original major. Therefore, its falsity must be due to the new minor premise which being thus proved to be false, its contradictory, *viz.*, the original conclusion, must be true.

(4) Baroco.

Baroco.

A. All P is M.	All horses are quadrupeds.
O. Some S is not M.	Some animals are not quadrupeds.
∴ O. Some S is not P.	∴ Some animals are not horses.

If the conclusion be not true, its contradictory, *viz.*, 'All S s P' or 'All animals are horses,' must be true. With this as the *ninor premise*, and the original major as the major, let us form new syllogism in the first figure.

A. All P is M.	All horses are quadrupeds.
A. All S is P.	All animals are horses.
∴ A. All S is M.	∴ All animals are quadrupeds.

This argument is Barbara, P (or horses) being the middle erm. The new conclusion is false, being the contradictory of ne orginal minor premise. To what is its falsity due? It can neither be due to the process of reasoning, because, it is Barbara, nor can it be due to the new major premise, which is the same as the original major. Therefore, the new minor premise is false. Therefore, its contradictory, the original conclusion, must be true.

N.B.—In indirectly reducing moods of the second figure, we get a valid syllogism in the first figure only by taking the contradictory of the given conclusion as the *minor* premise of the new syllogism.

Third
Figure :
Darapti.

2. Moods of the Third Figure.

(1) Darapti.

A. All M is P.
A. All M is S.
∴ I. Some S is P.

If the given conclusion be not true, its contradictory, 'No S is P,' must be true. With this, as the *major* premise and the original minor as the minor premise, let us form a new syllogism in the first figure.

E. No S is P.
A. All M is S.
∴ E. No M is P, according to Celarent, S being the middle term.

This new conclusion being the *contrary* of the original major premise must be false. To what is its falsity due? It can neither be due to the process of reasoning which is Celarent, nor to the new minor premise, which is the same as the original minor. Therefore, it must be due to the new major premise, which, being thus proved to be false, its contradictory, the given conclusion must be true.

Disamis.

(2) Disamis.

I. Some M is P.
A. All M is S.
∴ I. Some S is P.

If the given conclusion be false, its contradictory, 'N S is P', must be true. With this as the *major* premise, an the original minor as the minor, let us form a new syllogis in the first figure.

E. No S is P.
A. All M is S.
∴ E. No M is P, according to Celarent, S being the middle term.

Now, this new conclusion, being the contradictory of the original major premise, must be false. Its falsity can neither be due to the process of reasoning which is Celarent, nor can it be due to the new minor premise, which is the same as the original minor. Therefore, the new major premise is false. Hence its contradictory, the original conclusion, is true.

(3) Datisi.

Datisi.

A. All M is P.
I. Some M is S.
∴ I. Some S is P.

If the given conclusion be not true, its contradictory, *viz.*, 'No S is P', must be true. With this, as the *major* premise and the original minor as the minor, let us draw a new syllogism in the first figure, thus :—

E. No S is P.
I. Some M is S.
∴ O. Some M is not P, according to Ferio, S being the middle term.

Now, the new conclusion being the contradictory of the original major must be false. To what is its falsity due? It can neither be due to the process of reasoning which is Ferio, a valid mood in the first figure, nor to the minor premise which is the same as the minor premise of the given syllogism. Therefore, its falsity is due to the new major premise—which being thus proved to be false—its contradictory, the original conclusion, must be true.

(4) Felapton.

Felapton.

E. No M is P.
A. All M is S.
∴ O. Some S is not P.

If the conclusion be not true, its contradictory, 'All S is P', must be true. Let us have a new syllogism in the first figure in which this is the *major* premise and the given minor is the minor premise thus :

A. All S is P.
A. All M is S.
∴ A. All M is P, according to Barbara, S being the middle term.

The new conclusion being the contrary of the original major is false. Its falsity cannot be due to the process of reasoning which is Barbara nor can it be due to the minor premise which is the same as the original minor. Therefore, it must be due to the new major—which being false, its contradictory, the original conclusion must be true.

Bocardo.

✓(5) Bocardo.

O.	Some M is not P.	O.	Some men are not wise.
A.	All M is S.	A.	All men are mortal.
∴ O.	Some S is not P.	∴ O.	Some mortals are not wise.

If the given conclusion be not true, its contradictory, 'All S is P', or 'All mortals are wise', must be true. With this as the *major* premise, and the given minor as the minor, let us draw a new syllogism in the first figure, thus :—

A.	All S is P.	A.	All mortals are wise.
A.	All M is S.	A.	All men are mortal.
∴ A.	All M is P.	∴ A.	All men are wise.

This new conclusion being the contradictory of the original major premise must be false. Its falsity cannot be due to the process of reasoning, which is Barbara nor to the new minor premise which is the same as the original minor. Therefore, the new major is false and hence its contradictory, the given conclusion must be true.

Ferison.

(6) Ferison.

E. No M is P.
I. Some M is S.
∴ O. Some S is not P.

If the given conclusion be not true, its contradictory, 'All S is P', is true. With this as the *major* premise, and the given minor as the minor, let us form a new syllogism in the first figure, thus :—

A. All S is P.
I. Some M is S.
∴ I. Some M is P according to Darii, S. being the middle term.

This new conclusion is false, because it is the contradictory of the original major premise. Its falsity cannot be due either to the process of reasoning which is Darii, or to the minor premise which is the same as the original minor. Therefore, it must be due to the new major premise, which being false, its contradictory, the given conclusion, is true.

N.B.—In indirectly reducing the moods of the third figure, we get a valid syllogism in the first figure only by taking the contradictory of the given conclusion as the *major* premise of the new syllogism.

3. Moods of the Fourth Figure.

Fourth Figure.

(1) Bramantip.

Bramantip.

A. All P is M.
A. All M is S.
∴ I. Some S is P.

If the conclusion be not true, its contradictory 'No S is P,' must be true. With this as the *major* premise, and the original minor as the minor, let us draw a new syllogism in the first figure thus :—

E. No S is P.
A. All M is S.
∴ E. No M is P, according to Celarent, the middle term being S.
∴ E. No P is M, by Conversion.

Now the proposition, No P is M, being the contrary of the original major must be false. Now, this proposition which is proved to be false is the converse of the new conclusion. Therefore, its falsity must be due either to the violation of the rules of Conversion or to the falsity of the Convertend. But the rules of Conversion have been correctly observed ; therefore, the Convertend, *viz.*, the new conclusion is false.

If the new conclusion be false—to what is its falsity due ? It can be due neither to the process of reasoning, which is Celarent, nor to the new minor premise, which is the same as the original minor. Therefore, it must be due to the new major premise—which being proved to be false, its contradictory, the original conclusion must be true. Therefore, the given syllogism is correct.

Camenes.

(2) Camenes.

A. All P is M.
E. No M is S.
∴ E. No S is P.

If the conclusion be not true, its contradictory, 'Some S is P,' must be true. With this as the *minor* premise, and the given major as the major, let us draw a new syllogism in the first figure :—

A. All P is M.
I. Some S is P.
∴ I. Some S is M, according to Darii, P, being the middle term.
I. Some M is S, by Conversion.

Now, this proposition, 'Some M is S,' is false, being the contradictory of the original minor premise. Its falsity cannot be due to the process of reasoning, *viz.*, Conversion, because all its rules have been observed. Therefore, it must be due to the falsity of the premise, 'Some S is M'. Hence, 'Some S is M,' the conclusion of the new syllogism is false.

To what is its falsity due? It can neither be due to the major premise, which is the same as the original major, nor to the process of reasoning, which is Darii. Therefore, its falsity must be due to the new minor premise, which being thus proved to be false, its contradictory, the original conclusion, must be true.

Dimaris.

(3) Dimaris.

I. Some P is M.
A. All M is S.
∴ I. Some S is P.

If the conclusion be not true, its contradictory, 'No S is P,' must be true. With this as the *major* premise, and the given minor as the minor, let us form a new syllogism in the first figure thus :—

E. No S is P.
A. All M is S.
∴ E. No M is P, according to Celarent, S being the middle term.
∴ E. No P is M, by Conversion.

The converse of the new conclusion is false, being the contradictory of the given major premise. Therefore the new conclusion is false. The falsity of the new conclusion must be due to the falsity of the new major premise because the process of reasoning is Celarent, a perfectly valid mood and also because the new minor premise is the same as the original minor. The new major premise being false, its contradictory the original conclusion must be true.

(4) Fesapo.

Fesapo.

E. No P is M.
A. All M is S.
∴ O. Some S is not P.

If the conclusion be not true, its contradictory, "All S is P," must be true. With this as the *major* premise, and the given minor as the minor, let us form a new syllogism in the first figure thus :—

A. All S is P.
A. All M is S.
∴ A. All M is P, according to Barbara, S being the middle term.
∴ I. Some P is M, by Conversion.

This last proposition being the contradictory of the given major premise is false. Its falsity cannot be due to faulty Conversion, because, all the rules of Conversion have been duly observed. Therefore, the convertend 'All M is P' *viz.*, the new conclusion is false. Its falsity cannot be due either to falsity of the process of the reasoning, which is Barbara, or to the falsity of the minor, which is the same as the original minor. Therefore, it must be due to the new major. Thus, the new major premise is false and hence its contradictory, the original conclusion must be true.

N.B.—The Contradictory of the given conclusion may be taken as the *minor* premise and yet we may have a valid syllogism in the first figure.

Fresison.

(5) Fresison.

E. No P is M.
I. Some M is S.
∴ O. Some S is not P.

If this conclusion be not true, its contradictory 'All S is P' must be true. With this contradictory as the major premise, and the given minor as the minor, let us form a new syllogism in the first figure thus :—

A. All S is P.
I. Some M is S.
∴ I. Some M is P, according to Darii, S being the middle term.
∴ I. Some P is M, by Conversion.

This last proposition being the contradictory of the original major is false. Its falsity must be due to the falsity of the Convertend (*viz.*, the new conclusion), because, all the rules of Conversion have been duly observed. Therefore, the new conclusion is false. The falsity of the new conclusion is not due to the process of reasoning, which is Darii, nor to the new minor premise, which is the same as the original minor. Therefore, the new major premise is false and hence its contradictory, the given conclusion, is true.

The contradictory of the given conclusion may form the major premise or the minor premise in the new syllogism of the first figure.

Fresison can also be reduced indirectly *by taking the contradictory of the given conclusion*, viz., *All S is P, as the minor premise of the new syllogism* and borrowing the major premise (E. No P is M.) from the major premise of the given syllogism thus :—

E.—No P is M. (Original Major).
A.—All S is P. (Contradictory of the given conclusion).
∴ E.—No S is M. according to Celarent.
∴ E.—No M is S. by Conversion.

This last proposition, 'No M is S,' is the contradictory of the original minor and therefore false. To what is its alsity due ? It cannot be due to faulty Conversion and therefore, the premise 'No S is M' is false. The falsity of this is not due to faulty process of reasoning, because it is Celarent, nor to the new major premise, which is the same as the original major. Therefore, the new minor premise is false. Therefore, the original conclusion is true.

Thus, we find in this case, the new syllogism in the first igure can be formed by taking the contradictory of the given conclusion, either as the major premise or as the minor premise in the new syllogism as desired, because in both cases, joined with the other premise in the given syllogism, we get a valid mood in the first figure.

Summary of Results

1. In indirectly reducing **the moods of the 2nd figure and Camenes** (4th Fig.) the contradictory of the given conclusion is taken as the **minor premise.**
2. In indirectly reducing the **moods of the 3rd and 4th figures (except Camenes),** the contradictory of the given conclusion is taken as the **major premise.**
3. In indirectly reducing **Fesapo** and **Fresison, the** contradictory of the given conclusion may be taken **either as the major or the minor premise.**

Sec. 15. Fundamental, Weakened and Strengthened Syllogisms.

A. Fundamental and Non-Fundamental Syllogisms.

A **Fundamental Syllogism** is one, in which neither of the extreme terms is distributed in the premises, without being distributed in the conclusion and the middle term is distributed only once, *i.e.*, **no term is unnecessarily distributed in the premises.**

In a Fundamental syllogism, no term is unnecessarily distributed in the premises.

The rules of Syllogism require that the middle term should be distributed at least once in the premises and no term should be distributed in the conclusion, unless it is distributed in the premises. Now, if we examine the nineteen valid moods, we shall find that

Darapti, Felapton, Bramantip and Fesapo are not fundamental.

in three moods, *viz.*, **Darapti,** (3rd figure), **Felapton,** (3rd figure) and **Fesapo,** (4th figure), the middle term is distributed in both the premises and in one mood, *viz.*, **Bramantip** (4th figure), the major term is distributed in the major premise, but not distributed in the conclusion. Hence, we may say, that in **Darapti, Felapton** and **Fesapo,** *the middle term is once unnecessarily distributed* and in **Bramantip,** *the major term is unnecessarily distributed* in the premise, or in other words, such distribution is not necessary to justify the conclusion. Even if the middle term had been distributed only once and not twice in **Darapti, Felapton** and **Fesapo** and even if the major term had not been distributed in the major premise in **Bramantip,** the same conclusions would have followed.

Thus, out of nineteen valid moods, as shown in the mnemonic lines, *fifteen* are fundamental and *four,* viz., **Darapti, Felapton, Bramantip** and **Fesapo** are non-fundamental.

B. Weakened and Non-Weakened Syllogisms.

In a Weakened Syllogism, the conclusion is particular though from the given premises, a universal conclusion can be drawn.

A Weakened Syllogism or Subaltern mood is a syllogism, in which a particular proposition is drawn in the conclusion though a universal conclusion is justified by the premises. For example, we have seen, that the combination AA gives an A conclusion (*Barbara*) in the first figure. Now, where the conclusion can be an A proposition, it can certainly be an I proposition, because the truth of the universal includes the truth of the particular. Similarly, where the conclusion can be E, it can certainly be also an O proposition. Thus, wherever a universal conclusion can be drawn, we may also draw the corresonding particular proposition in the conclusion. ence, when in a syllogism, a particular proposition drawn though a universal proposition may be drawn the conclusion, the syllogism is called a Weakened llogism or a Subaltern mood. In this case, *the onclusion is weakened.*

We have seen, that out of 19 valid moods in the our figures, *five* moods have conclusions which are niversal propositions, viz., *Barbara, Celarent, Cesare, amestres, Camenes.* All these syllogisms may be eakened and these weakened syllogisms may be alled **Barbari** (AAI) and **Celaront** (EAO) in the 1st gure; **Cesaro** (EAO) and **Camestros** (AEO) in the nd figure; and **Camenos** (AEO) in the 4th figure. n the 3rd figure, the conclusions are particular and s such, there cannot be any weakened syllogism the third figure.

Five Weakened Syllogisms.

. Strengthened and Non-Strengthened Syllogisms.

A Strengthened syllogism is one, in which one f the premises is unnecessarily stronger than hat is required, to prove the conclusion, i.e., to ay, one of the universal premises may be taken to e particular and yet the same conclusion would ollow. For example take **Darapti:**

In a Strengthened Syllogism, one of the premises is universal, though even if it had been particular, the same conclusion would have followed.

Darapti

A. All M is P.
A. All M is S.
∴ I. Some S is P.

If instead of the given major premise, which is n A proposition we take the corresponding I, the ame conclusion would follow. Thus:

I. Some M is P.
A. All M is S.
∴ I. Some S is P.

This mood of course has a special name given t it, *viz., Disamis.*

Similarly, in this case, if instead of the given minor pr mise, which is an A proposition, we take the correspondir I proposition, the same conclusion will follow. This would b called *Datisi.*

We find that *all the syllogisms which are nc fundamental, (viz. Darapti, Felapton, Bramantip* an *Fesapo) are strengthened.* We have already examine **Darapti.** In **Felapton** (EAO—3rd figure), th major premise, which is E, is unnecessarily stronge than what is required and the same conclusion woul follow if the major premise be O (OAO—Bocardo) Similarly, in **Bramantip** (AAI—4th figure), th major premise (A) may be taken to be I (IAI— Dimaris); and in **Fesapo** (EAO—4th figure), th minor premise (A) may be taken as I (EIO— Fresison); and yet the same conclusions would follow

It may be pointed out that in addition to thes four moods, *Darapti, Felapton, Bramantip and Fesapc* which are strengthened syllogisms, *all the subalter moods, except Camenos (AEO—4th figure)* are als *strengthened syllogisms.* So far as *Camenos* is con cerned, we cannot say that any premise is unnecessaril stronger than what is required to prove the conclusion because, if we take the corresponding particular, nc conclusion follows thus:

Camenos.

A. All P is M.
E. No M is S.
∴ O. Some S is not P.

In this case, if we take an I proposition in th major, instead of the given A, or an O propositior the minor, instead of the given E, no conclusion ould follow. Thus, *Camenos* cannot be called a engthened syllogism.

Camenos is neither fundamental nor strengthened because, a term is unnecessarily distributed but no premise can be made weaker.

It should be noted that in *Camenos,* the minor m 'S' is unnecessarily distributed, *i.e.*, distributed the minor premise but not in the conclusion and such, it is not a fundamental syllogism, in which, term can be unnecessarily distributed. Thus, *menos is not a fundamental syllogism but it cannot called a strengthened syllogism.*

The remaining four subaltern moods, viz. **rbari** (AAI—1st figure), **Celaront** (EAO—1st ure), **Cesaro** (EAO—2nd figure), and **Camestros** EO—2nd figure) are all strengthened syllogisms. **Barbari,** the minor premise may be weakened to and yet the same conclusion would follow—AII, figure Darii; in **Celaront,** the minor premise may weakened to I and yet the same conclusion ould follow—EIO—Ferio; in **Cesaro,** the minor emise may be I and yet the conclusion O would llow—EIO—Festino; and lastly, in **Camestros,** the nor premise may be O and yet the same conclusion ould follow—AOO—Baroco.

Strengthened syllogisms are eight in number.

Thus, if we take into account the subaltern moods weakened syllogisms, we may say that *strengthened logisms are eight in number, viz.,*

Barbari, Celaront—1st Figure.
Cesaro, Camestros—2nd Figure.
Darapti, Felapton—3rd Figure.
Bramantip, Fesapo—4th Figure.

Again, *if we take into account the subaltern moods, se moods which are not fundamental are five in mber, viz., Darapti, Felapton, Bramantip, Fesapo d Camenos.*

In conclusion, we may note that a syllogism i called strengthened, because one of its *premises* i strengthened while a syllogism is called weakenec because its *conclusion* is weakened. In a strengthene syllogism, one of the premises may be made weake while in a weakened syllogism, the conclusion migh have been stronger.

Sec. 16. Pure Hypothetical and Pur Disjunctive Syllogisms.

All this time we had confined our attention to Pur Categorical Syllogisms, in which all the three cons tituent propositions were categorical. Now, similarly all the constituent propositions may be Hypothetic propositions, in which case, we have *Pure Hypothe tical Syllogisms;* or again, all the constituent propos tions may be disjunctive, in which case, we have *Pur Disjunctive Syllogisms.*

As for **Pure Hypothetical Syllogisms,** they con sist of three hypothetical propositions. Now, w know that hypothetical propositions admit of th same distinction of quality and quantity as Catego rical propositions and as such, there may be form of Pure Hypothetical Syllogisms, corresponding t every form of Pure Categorical Syllogisms. Fo example, the following Pure Hypothetical Syllogism i in the mood *Barbara*:—

If A is B, C is D ;
If D is E, A is B ;
∴ If D is E, C is D.

As for **Pure Disjunctive Syllogisms,** in which a the three constituent propositions are disjunctive, w should remember that disjunctive propositions are a ffirmative. (Ch. VII, Sec. 2 D, Note 2.) Hence the ules of syllogism relating to quality have no applica- on. These Pure Disjunctive Syllogisms are so rare at they hardly call for mention.

Exercises Worked Out.

. Prove that if the conclusion be universal, the middle term can be distributed only once in the premises.

Proof.—If the conclusion be universal it must be either or E.

If the conclusion be A, both the premises must be A (the onclusion being affirmative, both the premises must be affir- ative and the conclusion being universal, both the premises ust be universal). Both premises being A, only two terms e distributed in the premises. The conclusion being A, the inor term is distributed therein, so that it must be distri- uted in the minor premise. Out of two terms distributed in e two premises, one is the minor term. Therefore, the iddle term can be distributed only once.

If the conclusion be E, one premise must be E, and the her premise must be A (the conclusion being universal, oth the premises must be universal and conclusion being egative, one premise must be negative). If one premise be and the other be A, then between them, they distribute ree terms only. Now, the conclusion being E, both the inor and the major terms are distributed in the conclusion d must, therefore, be previously distributed in the premises. ut of three terms distributed in the premises, one is the inor term, one is the major term. Therefore, the middle rm can be distributed only once.

. Prove that O cannot be a premise in the 1st figure.

Proof. In the first figure, the middle term is subject in e major and predicate in the minor.

If O be taken as the major premise, the minor premise ust be A (because both premises can neither be particular r negative), and the conclusion O. If the major premise be and minor A, in the first figure, the middle term is undis- ibuted in both and hence, no conclusion follows.

If O be taken as the minor premise, the major premise ust be A and the conclusion must be O. The conclusion being O, the major term is distributed therein, and should be distributed in the major premise. The major premise being A, in the first figure, the major term is not distributed therein, and hence no conclusion follows.

Thus, O can neither be the major premise nor the minor premise in the first figure.

3. Prove that O cannot be a minor premise, in any other figure but the second figure.

Proof.—(*i*) O cannot be the minor premise in *the first figure*, because as shown in 2 above, it would lead to the fallacy of Illicit Major.

(*ii*) If O be the minor premise in the *third figure*, the major must be A and the conclusion O. The conclusion will then distribute its predicate, the major term, which should be distributed in the major premise. In the major premise, which is A, the major term is predicate (being the third figure) and is therefore undistributed. Hence if O be the minor premise in the third figure it leads to the fallacy of Illicit Major.

(*iii*) If O be the minor premise in the *fourth figure*, the major premise must be A. In the fourth figure, the major premise being A, the middle term is undistributed in it ; the minor being O, the middle term is also undistributed in the minor premise. Therefore, the supposition, that O is the minor premise in the fourth figure, leads to the fallacy of Undistributed Middle.

(*iv*) O however, can form the minor premise *in the second figure*. The minor premise being O, the major is A, and the conclusion O. The conclusion distributes the major term, which being the subject of an A proposition (in the second figure the major term is the subject of the major premise), is distributed. Again, the middle term is distributed in the minor premise (in the second figure, the middle term is predicate in the minor premise). Hence a legitimate conclusion can be drawn.

Thus, an O proposition cannot be the minor premise in any figure other than the second figure.

4. Prove that O cannot be a premise in the fourth figure.

Proof.—In the fourth figure, the middle term is predicate in the major and subject in the minor premise. If O be a premise, the other premise must be A and the conclusion O.

If O be taken as the major premise, the major term is undistributed in it and cannot be distributed in the conclusion. But the conclusion, if any, must be O, distributin the major term. Thus, this supposition will lead to the fallacy of Illicit Major.

If O be taken as the minor premise, the middle term is undistributed in it. In order that a conclusion may be drawn, the middle term must be distributed in the major premise but it is not so distributed therein (the middle term being the predicate in the major premise A, is undistributed). Therefore,O cannot be a premise in the fourth figure.

5. Prove that O can be the major premise only in the 3rd figure.

Proof.—(i) O cannot be the major premise in the first figure.

In the first figure, the middle term is the subject in the major premise, and predicate in the minor.

If O be the major premise, the minor must be A. In the first figure neither a minor A premise nor a major O premise distributes the middle term. Hence an attempt to draw a conclusion would lead to the fallacy of Undistributed Middle.

(ii) O cannot be the major premise in the second figure.

In the second figure the middle term is predicate in both. If O be the major premise, the major term, its subject, is undistributed ; but the conclusion, if any, must be O, distributing the major term. Thus this supposition leads to the allacy of Illicit Major.

(iii) O cannot be the major premise in the fourth figure.

In the fourth figure, the middle term is predicate in the major and subject in the minor.

If O be taken as the major premise, the major term is undistributed in it but the conclusion, if any, must be O, listributing the major term, thus leading to the fallacy of llicit Major.

(iv) O can be the major premise in the third figure.

In the third figure, the middle term is subject in both he premises. If O be the major premise, the predicate *i.e.,* he major term is distributed therein and can safely be distri-uted in the conclusion. Again O being the major, the minor remise must be A distributing its subject, which in the hird figure is the middle term. Thus in drawing a conclusion hich must be O, no rule of syllogism is violated.

. Prove that O cannot be the major premise in the 2nd figure. (See 5).

7. If the major term of a Syllogism be the predicate of the major premise, what do you know about the minor premise?

Proof.—The major term which is the predicate of the major premise must be either distributed or undistributed.

If the major term is undistributed in the major premise, it cannot be distributed in the conclusion. As only affirmative propositions do not distribute their predicate, the conclusion must be affirmative. Therefore, both the premises including the minor premise must be affirmative.

If the major term is distributed, the major premise is negative. If one premise be negative, the other premise must be affirmative to justify a conclusion.

Therefore, the minor premise must be affirmative.

8. Prove that, in every figure, if the minor premise be negative, the major must be universal.

Proof.—If the minor premise be negative, the major premise must be affirmative, and the conclusion must be negative. As the conclusion is negative, the major term is distributed therein so that it must be distributed in the major premise. The major premise is affirmative and therefore the predicate is undistributed. The other term which must be the major term must be distributed and this is only possible if the major premise is universal.

9. Prove that if the conclusion be A, the argument must be in the 1st figure.

Proof.—If the conclusion be A, both the premises must be A, and the minor term is distributed in the conclusion. Hence the minor term must be the subject in the minor premise in order that it may be distributed and the middle term is thus the predicate of the minor premise. The middle term therefore cannot be distributed in the minor premise and must be distributed in the major. Hence the middle term must be subject in the major premise.

Thus, if the conclusion be A, the middle term is subject in the major premise and predicate in the minor, *i.e.*, the argument is in the first figure.

10. Prove that if the conclusion be universal, the middle term can be distributed but once.

Proof.—If the conclusion be universal negative, i.e. E, one premise must be E and the other A. Thus, thre erms will be distributed in the premises, of which, one must e the major and the other minor, because, both these terms re distributed in the conclusion.

If the conclusion be universal affirmative A, both the remises must be A--thus distributing only two terms in the remises. Of these, one must be the minor term which is istributed in the conclusion. Therefore only one more term an be distributed. Thus the middle term can be distributed nly once.

1. What can be determined respecting a syllogism under each of the following conditions? Give reasons for your answers:—

(a) When only one term is distributed and that nly once.

When only one term is distributed, it must be the iddle term. Therefore no term can be distributed in the onclusion, *i.e.*, the conclusion must be an I proposition.

(b) When only one term is distributed and hat only twice.

When only one term is distributed, whether once or twice, must be middle term. No other term being distributed, e major and the minor terms are not distributed in the remises and cannot be distributed in the conclusion. Therefore e conclusion must be I.

(c) When two terms only are distributed, each nly once.

Of these two terms, one must be the middle term. The ther distributed term cannot occur in the conclusion because that case it must be previously distributed in the corresonding premise and it would require the distribution of three erms which is not the case here. Therefore no term is disibuted in the conclusion. Therefore the conclusion is I.

(d) When two terms only are distributed each wice.

Of these two terms which are distributed each twice, one ust be the middle term. The other term is thus distributed vice—once in the premise and again in the conclusion. Is is term the major or the minor term'?

If it be the minor term, *i.e.*, the subject of the concluon, it can be distributed in the conclusion only if the conusion is universal, *i.e.*, either A or E. The conclusion in is case cannot be E because that would distribute the major term also. If the conclusion be A, both the premises must be A. and in all the three propositions only three terms can be distributed whereas here four terms are distributed in all (two terms, each twice). Thus the other term cannot be the minor term.

If it be the major term, *i.e.*, the predicate of the conclusion, it can be distributed in the conclusion only if the conclusion be negative, *i.e.*, either E or O. It cannot be E because that would also distribute the minor term. Hence the conclusion can only be O.

12. Show that a negative minor premise necessitates a universal major. (Answer See 8).

13. Show that a particular major precludes a negative minor. (This is General Syllogistic Rule No. 10).

14. Prove that if the middle term be distributed in both the premises the conclusion cannot be universal.

Proof.—If the conclusion be universal, it must be E or A. If A. both premises must be A and the minor term must be distributed in the premise. As the middle term is distributed in both the premises, and as both premises are A propositions, the minor term cannot be distributed in the minor premise. Hence the conclusion cannot be A.

If the conclusion be E, both the major and the minor terms would be distributed therein and these terms must also be distributed in the premises. Again if the conclusion be E, one premise must be A and the other E—thus distributing only three terms between them. Of these terms, two terms are the middle term and threfore only one term, *i.e.*, either minor or major can be distributed in the premise. Hence in drawing an E conclusion, we either fall into the fallacy of Illicit Major or Illicit Minor.

Therefore, in these circumstances, the conclusion cannot be universal.

15. Given that the major premise of a valid syllogism is affirmative and that the major term is distributed, both in premise and conclusion, while the minor term is undistributed, in both, determine the syllogism.

ANSWER.—If the major premise be affirmative and the ajor term is distributed in it, then, the major premise is A nd the major term is its subject.

If the major term is distributed in the conclusion the onclusion must be negative and as the major premise is ffirmative, the minor premise must be negative.

If the minor term is undistributed in the minor premise hich we find is negative, then the minor premise must be articular negative O and the minor term must be its subject.

Thus the major term is the subject of the major premise nd the minor term is the subject in the minor premise. hus the middle term is the predicate in both. Hence it is the second figure. Hence the major premise is A, the minor remise is O and the conclusion is O in the second figure. It therefore the valid mood called Baroco.

Exercise XI.

1. Define Syllogism. Show that it is a form of mediate owledge and of Deductive Inference.

2. Show that the second figure of the syllogism can ove only negative conclusions. Take the following syllosm and determine whether it is valid or not by reducing to the first figure.

All suns are self-luminous.
Some steller bodies are not self-luminous.
Therefore, some steller bodies are not suns.

[Answer.—This is a concrete example of Baroco.]

3. In which of the following syllogisms is the conclusion lid under any mood and figure and in which it is invalid d why?—EAE, EAA, EIO, IEI?

4. Construct syllogism in Camestres and reduce it, both the Direct and the Indirect method.

5. Explain the meaning of Illicit Process in Reasoning d explain why it is that it makes a valid conclusion imssible. Illustrate your meaning by examples. Distinguish e different forms of Illicit Process and give an example of ch.

6. State the meaning of the following :—

The middle, minor and major terms of the syllogism. xplain the relations of these terms, illustrating your meang by examples. Determine the number of the possible gures. Which of the syllogistic figures is alone capable of oving a universal affirmative and in what mood or moods one? Give a reason for your answer with examples.

7. Reduce a concrete syllogism (*a*) in Fesapo and (*b*) one Felapton, both by the Direct and by the Indirect method.

8. Answer the following :—

(*a*) Most Fungi are poisonous and this is a fungus. Can any legitimate inference be drawn? If so, what is it? Give your reason for your answers.

[ANSWER.—(*a*) The logical form of the proposition, "Most fungi are poisonous," is "Some fungi are poisonous." Therefore, the premises given are equivalent to—

Some fungi are poisonous .. (I)
This is a fungus .. (A)

This is in the first figure, because the middle term is subject in the major and predicate in the minor premise. In the first figure, IA does not yield any conclusion—the middle term being undistributed in both the premises].

(*b*) You should trust him; There are more to be trusted than you think. Examine the reasoning implied here.

[ANSWER.—The proposition, "Men are more to be trusted than you think," means "Some men not trusted by you are men who should be trusted by you." The proposition, "You should trust him," which is the conclusion here, is equivalent to, "He *is* a man who should be trusted by you." The minor premise, which is suppressed here, obviously, is 'He *is* a man not trusted by you.' Here, the middle term 'men not trusted by you,' is undistributed in both the premises and hence, no conclusion can follow.]

9. Explain why is it that the third figure can give only particular conclusions.

10. Give a concrete example of (*a*) *Disamis*, (*b*) *Bramantip* and (*c*) *Baroco* and reduce each of them both by the Direct and the Indirect method.

11. Prove :—
   (*a*) Two particular premises prove nothing.
   (*b*) If one premise be particular the conclusion must be particular.
   (*c*) In the third figure, the conclusion must be particular.

12. Discuss the importance of Aristotle's *Dictum de omni et nullo*.

13. If the premises of a syllogism are false, does this make the reasoning false? Illustrate your answer by a concrete example.

14. Explain the two kinds of Reduction. Give a concrete example of *Camenes* and reduce it by both the methods.

15. Prove that in the second figure, the major premise must be universal.

16. Distinguish between Direct and Indirect Reduction. Reduce the following argument to the first figure, both by the Direct and the Indirect methods :—

No stars are planets.
All planets are organic things.
∴ Some organic things are not stars.

[ANSWER.—This is EAO in fourth figure (Fesapo).]

17. Indicate the different modes of testing the validity of the syllogistic argument illustrating your answer with examples.

18. Define Syllogism, Mood and Figure, What are Subaltern moods, and why are they so called? Indicate the different modes of testing the validity of syllogistic arguments, and mention the moods which are equally valid in all the figures.

19. What are the characteristics of the Syllogism?

20. Frame concrete examples in *Camenes* and *Darapti* and reduce them, both directly and indirectly.

21. Test EAE and AEE in each figure.

22. Reduce by each of the two methods :—
All senators are men.
All senators are not philosophers.
∴ All men are not philosophers.

[ANSWER.—This is OAO in the third figure (Bocardo). Here the first proposition is the minor premise while the second proposition is the major premise.]

23. Prove that the conclusion is particular when a premise is particular. Is the converse of this rule true?

24. Prove the following rules :—

(*a*) Only the first figure can prove an A proposition.
(*b*) The minor premise must be affirmative in the first and third figures.

25. Why is the First Figure called Perfect? Take any mood in an Imperfect figure and reduce it either directly or indirectly to a mood in the first Figure.

26. Prove the following general syllogistic rules :—

(*a*) The middle term must be distributed at least once.
(*b*) No term must be distributed in the conclusion which was not distributed in one of the premises.

27. Attempt the following :—

(*a*) If the major premise in Fig. I were an I proposition, what fallacy would be committed?
[Either Undistributed Middle or Illicit Major.]

(*b*) If the major premise in Fig. II were particular, what fallacy would be committed?

(*c*) If the minor premise of a syllogism be O, what is the Figure and the Mood?

[ANSWER.—Third Figure—Mood AOO.—Baroco.]

28. Give the position of the Middle term in the second, third and fourth figures respectively.

29. Give the special rules of the Second Figure and prove any one of them.

30. Name the moods which prove an O proposition.

31. Reduce any mood of the third figure directly and indirectly.

32. Construct syllogisms to prove the folowing conclusions, stating the figure and the mood of each syllogism.

(*a*) John is bound to succeed in life.
(*b*) That train does not stop at this station.

33. Reduce a concrete example of Baroco both directly and indirectly.

34. State and prove the special syllogistic rules of the second figure. Examine the combinations of AEE, OAE, OIE and show whether they are valid under any of the syllogistic rules giving your reasons.

35. State Aristotle's *Dictum* and explain how it is the basis of all syllogistic reasoning.

Reduce by direct method the mood, Darapti and by the indirect method, the mood, Cesare.

36. Exhibit in detail how the valid moods of the Fourth Figure are determined and generalise from the valid moods the special rules of that figure.

37. (*a*) Reduce the following syllogism to the First Figure by the Direct method :—

All metals are elements.
No compounds are elements.
∴ No compounds are metals.

(*b*) Reduce the following syllogism to the First Figure by the Indirect method :—

Some men are not wise.
All men are rational.
∴ Some rational beings are not wise.

38. What is the function of the middle term in a Syllogism? Explain why the middle term should be distributed at least once.

39. Briefly indicate the process by which the valid moods are determined. How is it that IE is not valid in any of the figures, EI is so in all of them?

40. Prove the following :—

(*a*) If both the premises be affirmative, the conclusion must be affirmative.

(*b*) The premises IE can give no conclusion in any figure.

41. If the major term be distributed in the major premise and undistributed in the conclusion, determine the mood and the figure.

42. Show that the mood AEO in the fourth figure is (*a*) weakened syllogism but (*b*) is neither a fundamental nor a stengthened syllogism.

43. What is Reduction? Is Reduction necessary? Reduce *Disamis* both directly and indirectly.

44. State and analyse Aristotle's *Dictum de omnì et nullo*, and show how it forms the basis of reasoning in the first figure. Justify in this connection the importance of Reduction as a method of testing the validity of arguments, and illustrate its different forms.

45. Explain the special rules of the first Figure and examine its claim to be the type of normal reasoning.

CHAPTER XII.

MIXED SYLLOGISMS.

SEC. 1. Hypothetical-Categorical.
  A.—Rules.
  B.—Fallacies.
  C.—Reduction to Categorical form.
SEC. 2. Disjunctive-Categorical.
SEC. 3. Dilemma.
  A.—Structure of a dilemma.
  B.—Forms of dilemma.
  C.—Rebutting a dilemma.
  D.—Testing a dilemma.
    Formal correctness of a dilemma.
    Material correctness of a dilemma.
  Exercise XII.

Three forms of Mixed Syllogisms.

A Mixed Syllogism is one in which the constituent propositions are not of the same relation. It has three sub-divisions, *viz.*, (1) Hypothetical-Categorical, (2) Disjunctive-Categorical or simply, Disjunctive, and (3) Dilemma.

Sec. 1. Hypothetical-Categorical Syllogism.

Hypothetical-Categorical.

(**A Hypothetical-Categorical syllogism is a mixed syllogism consisting of a hypothetical major premise, a categorical minor premise and a categorical conclusion.**

Rules :

A. Rules.

The following two **Rules** govern this form of inference :—

(*a*) *To affirm the antecedent is to affirm the consequent but not conversely; and*

(*b*) *To deny the consequent is to deny the antecedent, but not conversely.*

Constructive and Destructive.

In the former case, the syllogism is called *Constructive* or is said to be *in the Modus Ponens;* while, in the latter case, the syllogism is called *Destructive* or is said to be *in the Modus Tollens.* Examples:

I. Modus Ponens. (Constructive).

Constructive.

A hypothetical-categorical syllogism is said to be **Constructive,** or **in the Modus Ponens,** when by affirming the antecedent of the major premise in the minor premise, we affirm the consequent of the major premise, in the conclusion. Thus:

Examples :

(*a*) If A is B, C is D. A is B. ∴ C is D.	(*a*) If he comes, I shall go. He comes. ∴ I shall go.
(*b*) If A is B, C is not D. A is B. ∴ C is not D.	(*b*) If it rains, he will not come. It rains. ∴ He will not come.
(*c*) If A is not B, C is D. A is not B. ∴ C is D.	(*c*) If he does not come, I shall go. He does not come. ∴ I shall go.
(*d*) If A is not B, C is not D. A is not B. ∴ C is not D.	(*d*) If it does not rain, the corn will not grow. It does not rain. ∴ The corn will not grow.

II. Modus Tollens. (Destructive).

Destructive.

A hypothetical-categorical syllogism is said to be **Destructive,** or **in the Modus Tollens,** when by denying the consequent of the major premise in the minor premise, we deny the antecedent of the major premise in the conclusion. Thus:—

Examples :

(*a*) If A is B, C is D. C is not D. ∴ A is not B.	(*a*) If he comes, I shall go. I shall not go. ∴ He does not come.
(*b*) If A is B, C is not D. C is D. ∴ A is not B.	(*b*) If it rains, he will not come He will come. ∴ It does not rain.

(*c*) If A is not B, C is D.	(*c*) If he does not come, I shall go.
C is not D.	I shall not go.
∴ A is B.	∴ He will come.
(*d*) If A is not B, C is not D.	(*d*) If it does not rain, the corn will not grow.
C is D.	The corn does grow.
∴ A is B.	∴ It rains.

It should be noted that the names, 'Modus Ponens' (Constructive) and 'Modus Tollens' (Destructive), have no reference to the quality of the minor premise or the quality of the conclusion, but simply to *whether in the minor premise, we affirm the antecedent or deny the consequent, of the major premise,* whatever that antecedent or consequent might be.

Fallacies.

B. Fallacies.

If we violate the rules, we commit the fallacies of either affirming the consequent, or denying the antecedent. Thus:

1. *Denying the antecedent.*

If A is B, C is D.	If he comes, I shall go.
A is not B.	He does not come.
∴ C is not D.	∴ I shall not go.

This argument is fallacious and the fallacy is called the **fallacy of denying the antecedent,** because in the minor premise we have denied the antecedent and on the strength of that we have denied the consequent in the conclusion. This is contrary to rules.

If we reduce the given Hypothetical-Categorical Syllogism to a Pure Categorical Syllogism by changing the major premise to the categorical form, it stands thus:

Pure Categorical.

A. All cases of A being B *are* cases of C being D.
E. This case *is not* a case of A being B.
∴ E. This case *is not* a case of C being D.

We find that the major term 'case of C being D' has been distributed in the conclusion without being distributed in the major premise, and hence we commit the fallacy of Illicit Major. Thus we find that *the fallacy of denying the antecedent corresponds to the fallacy of Illicit Major in Pure Categorical Syllogisms.* Again,

2. *Affirming the consequent.*

If A is B, C is D.　　If he comes, I shall go.
C is D.　　I shall go.
∴ A is B.　　∴ He comes.

This argument involves the **fallacy of affirming the consequent,** because in the minor premise we have affirmed the consequent and on the strength of that affirmed the antecedent in the conclusion which is contrary to rules.

If we reduce the given Hypothetical-Categorical Syllogism to a Pure Categorical Syllogism by changing the major premise to the categorical form, it stands thus:

Pure Categorical.

A. All cases of A being B *are* cases of C being D.
A. This case *is* a case of C being D.
∴ A. This case *is* a case of A being B.

We find that the middle term 'case of C being D' has not been distributed even once in the premises, and hence we commit the fallacy of Undistributed Middle. Thus we find that *the fallacy of affirming the consequent corresponds to the fallacy of Undistributed Middle in Pure Categorical Syllogisms.*)

C. Reduction to Categorical Form.

A Hypothetical-categorical syllogism may be reduced to a Pure Categorical syllogism, by reducing the major premise into a categorical proposition. Thus:—

Hypothetical-categorical.	*Pure Categorical.*
(1) If A is B, C is D. A is B. ∴ C is D.	All cases of A being B are cases of C being D. This is a case of A being B. ∴ This is a case of C being D.
(2) If he comes, I shall go. He comes. ∴ I shall go.	All cases of his coming are cases of my going. This is a case of his coming. ∴ This is a case of my going.

Sec. 2. Disjunctive-Categorical Syllogism.

Definition.

A Disjunctive-Categorical syllogism has a disjunctive major premise, a categorical minor premise and a categorical conclusion. This is also called *Disjunctive Syllogism.*

Rule :—
Deny one
∴ Affirm
the other.

Rule—The rule to be observed in this form of inference is—*Deny any of the alternatives of the Disjunctive major premise in the minor premise and you can affirm the other alternative of the major premise in the conclusion.* The falsity of the one implies the truth of the other. Thus:

(1) Either A is B or C is D.
A is not B.
∴ C is D.
(2) Either A is B or C is D.
C is not D.
∴ A is B.

The converse of the
above rule
is true
under certain circumstances.

There are some logicians (*e.g.* Ueberweg), however, who hold that *the converse of the above rule is also true*, *i.e.* to say, by affirming one alternative of the major premise in the minor premise, we can deny the other alternative in the conclusion. Thus:

(3) Either A is B, or C is D.
A is B.
∴ C is not D.

(4) Either A is B, or C is D.
C is D.
∴ A is not B.

It is clear that the *second rule is true, only when the alternatives are mutually exclusive, like contradictory terms.* Hence, as a general rule, only the first two forms, in which by denying one alternative, we affirm the other alternative, are true, while the third and the fourth forms are true only in exceptional cases.

Sec. 3. Dilemma.

A. Structure of a Dilemma.

Definition.

The Dilemma is a mixed syllogism, in which the major premise is a compound hypothetical proposition, the minor premise is a disjunctive proposition (the alternatives of which either affirm the antecedents or deny the consequents of the hypothetical major), and the conclusion is either categorical or disjunctive. Let us analyse the three constituent propositions of a dilemma:—

(*a*) Major premise = Compound Hypothetical.

(*a*) *The Major premise is a compound hypothetical proposition, i.e.* to say, it consists of two hypothetical propositions joined together.

(*b*) Minor premise = Disjunctive.

(*b*) *The Minor premise is a disjunctive proposition.* We know that according to the rules of Hypothetical-Categorical syllogisms, by affirming the antecedent of the hypothetical major in the minor premise, we can affirm the consequent of the hypothetical major in the conclusion; or, again, by denying the consequent of the hypothetical major in the minor premise, we can deny the antecedent of the hypothetical major in the conclusion. Now the dilemma is practically nothing but a combination of two hypothetical-categorical syllogisms. Hence, the two alternatives of the disjunctive minor premise of the dilemma either affirm the antecedents or deny the consequents of the two hypotheticals in the major premise, in order that in the conclusion, the consequents may be affirmed in the former case, or the antecedents may be denied in the latter case.

(*c*) Conclusion = either categorical or disjunctive.

(*c*) *The conclusion may be categorical or disjunctive.*

The word 'Dilemma' has passed into common speech and its ordinary use gives us a clue to its logical meaning. Popularly we are said to be in a dilemma or *between the two horns of a dilemma,* when only two courses are open to us, and both of them are attended with unpleasant consequences. We are between the devil and the deep sea—between Scylla and Charybdis. In Logic also, the peculiar feature of a dilemma in the choice of the alternatives which it offers: the alternatives are of such a kind, that while one of them must be accepted, both of them lead to results equally disagreeable.

B. Forms of Dilemma.

Constructive and Destructive.

A dilemma is called **Constructive,** if the disjunctive minor premise alternatively affirms the antecedents of the compound hypothetical major premise. A dilemma, on the other hand, is called **Destructive,** if the minor premise alternatively denies the consequents of the compound hypothetical major premise. Thus, whether a dilemma is constructive or destructive depends on the minor premise.

Simple and Complex.

Both Constructive and Destructive dilemma may be either Simple or Complex. In a **Simple Dilemma,** the conclusion is categorical, while in a **Complex Dilemma,** the conclusion is disjunctive. Thus whether a dilemma is simple or complex depends on the conclusion. Hence, there are four forms of Dilemma—(*i*) *Simple Constructive;* (*ii*) *Complex Constructive;* (*iii*) *Simple Destructive;* and lastly, (*iv*) *Complex Destructive.* Let us illustrate these four different forms.

Four forms :—

1. Simple Constructive Dilemma.

Simple Constructive.

If A is B, C is D and if E is F, C is D.
Either A is B or E is F.
∴ C is D.

If a man acts according to his own judgment, he will be criticised; and if a man is guided by the opinion of others, he will be criticised.

A man must act either according to his own judgment, or according to the opinion of others.

∴ In any case he will be criticised.

This dilemma is *simple,* because the conclusion is categorical; and *constructive,* because, in the minor premise, we affirm the antecedents of the major premise.

Another example : A classical illustration of the Simple Constructive Dilemma is furnished by the argument by which Empson, the notorious agent of Henry VII is said to have always been able to prove that his victim was capable of paying a large amount into the treasury :—

If the accused lives at a small rate, his savings must have made him rich ; if, on the other hand, he maintains a large household, his expenditure proves him to be wealthy.

But he either lives at a small rate or maintains a large household.

∴ He is rich in any case (and consequently can pay heavily to the king).

This piece of reasoning was called "*Empson's fork*".

Complex Constructive.

✓

2. Complex Constructive Dilemma.

If A is B, C is D and if E is F, G is H.
Either A is B or E is F.
∴ Either C is D or G is H.

The standing example of Complex Constructive Dilemma is the following dilemma, in which, the custodians of the Alexandrian library are said to have been placed by Caliph Omar in 640 A.D.

If the books are in conformity with the Koran, they are superfluous; and if they are not in conformity with the Koran, they are pernicious.

Either the books are in conformity with the Koran or not.

∴ Either they are superfluous or they are pernicious.

Simple Destructive.

3. Simple Destructive Dilemma.

If A is B, C is D and if A is B, E is F.
Either C is not D or E is not F.
∴ A is not B.

(1) If I am to carry out my plan, I must keep my pupils and if I am to carry out my plan, I must write my book.

Either I cannot keep my pupils or I cannot write my book.

∴ I cannot carry out my plan.

(2) A classical example of this is furnished by Zeno's famous dilemma to prove that Motion is impossible.

If the body moves, it must move either where it is, or where it is not.

But a body cannot move either where it is, or where it is not.

∴ A body cannot move at all, *i.e.*, Motion is impossible.

4. Complex Destructive Dilemma.

Complex Destructive.

If A is B, C is D and if E is F, G is H.
Either C is not D or G is not H.
∴ Either A is not B or E is not F.

If a man is dutiful, he will obey orders; and if he is intelligent, he will understand them.

But either he does not obey orders or he does not understand them.

∴ Either he is not dutiful or he is not intelligent.

Another example :—

If he were intelligent, he would see the worthlessness of his arguments; if he were honest, he would own himself wrong.

Either he does not see that his arguments are worthless or seeing it, he does not own himself wrong.

∴ Either he is wanting in intelligence or he is dishonest.

C. Rebutting a Dilemma.

Rebutting=Presenting a counter-dilemma.
Rule :

Rebutting a dilemma means presenting an equally cogent counter-dilemma, proving an exactly opposite conclusion. In rebutting a dilemma, **the consequents of the major premise change places and their quality is changed.** This rule is applicable only to Complex Constructive Dilemma.

Symbolical example.

Let us, first of all, rebut the symbolical Complex Constructive Dilemma given above.

If A is B, C is D and if E is F, G is H.
Either A is B or E is F.
∴ Either C is D or G is H.

Rebutted, it stands thus:

If A is B, G is not H, and if E is F, C is not D.
Either A is B or E is F.
∴ Either G is not H or C is not D.

Let us take some concrete examples :

Concrete examples :

(1) Given Dilemma.

If the books are in conformity with the Koran they are superfluous; and if the books are not in conformity with the Koran, they are pernicious.

Either the books are in conformity with the Koran or not.
∴ Either they are superfluous or pernicious.

Rebutted, It stands thus :

If the books are in conformity with the Koran, *they are not pernicious ;* and if the books are not in conformity with the Koran, *they are not superfluous.*

Either the books are in conformity with the Koran or not.
∴ Either they are not pernicious or they are not superfluous.

(2) The dilemma of the Athenian mother.

If you act justly, men will hate you and if you act unjustly, gods will hate you.

Either you act justly or act unjustly.
∴ Either men will hate you or gods will hate you.

The son rebutted the mother's dilemma by the following equally cogent dilemma :—

If I act justly, *gods will not hate me,* and if I act unjustly *men will not hate me.*

Either I act justly or act unjustly.
∴ Either gods will not hate me or men will not hate me

(3) Given Dilemma.

If a man is single, he has none to take care of him (and therefore, he is unhappy); and if a man is married, he has t take care of a wife (and, therefore, he is unhappy).

Either a man is single or he is married.
∴ Either he has none to take care of him or he has t take care of a wife (and, therefore, he is unhappy in eithe case).

Rebutted, It stands thus :

If a man is single, *he has not to take care of a wife* (an therefore, he is happy); and if a man is married, *he has wife to take care of him* (and, therefore, he is happy).

Either a man is single or married.
∴ Either he has not to take care of a wife or he has a wi to take care of him (and, therefore, he is happy in any case

(4) Given Dilemma.

One of the best known dilemmas is the "*Litigiosus*". It related that Protagoras, the Sophist, agreed to train Euathl the art of Rhetoric, on condition that one half of the fee ould be paid at once, and the other half when Euathlus won s first case. As Euathlus did not undertake any suit, and elayed payment. Protagoras sued him and confronted him ith the following dilemma :—

"If you lose this suit, you must pay me by the order of the ourt, and if you win it you must pay me by our contract."

o this the worthy pupil replied by the following counter-dilemma:—

"If I lose this suit, I shall not pay you, according to our ntract, and if I win this suit, I shall not pay you, according the order of the Court."

. Testing a Dilemma.

In order that a dilemma may be logically correct, must have both *formal* and *material validity.* It ust be shown that not only the rules relating to the ode of argument have been observed but that the ropositions constituting the dilemma are true as a atter of fact.

ormal Correctness of a Dilemma.

Formal correctness of dilemma depends on the observance of the rules of hypothetical-categorical syllogisms.

We have seen that the dilemma is nothing but a ombination of two hypothetical-categorical syllogisms. ence, in order to determine whether a given dilemma *formally* correct or not, we have to analyse it into o hypothetical-categorical syllogisms, and then amine whether the rules relating to such syllogisms ave been observed. The rules of hypothetical-categocal syllogisms are that if, in the minor premise, we firm the antecedent of the hypothetical major, we can firm the consequent in the conclusion, but not conersely; and again, if in the minor premise, we deny e consequent of the hypothetical major, we n deny the antecedent in the conclusion, but not conversely. Now, if on an analysis of the dilemma, it be found that these rules have been observed, the dilemma is formally correct. For example, let us take the following Simple Constructive Dilemma:

If A is B, C is D and if E is F, C is D.
Either A is B or E is F.
∴ C is D.

Resolved into its constituent hypothetical-categorical syllogisms, it stands as follows:

(1) If A is B, C is D.
A is B.
∴ C is D.

(2) If E is F, C is D.
E is F.
∴ C is D.

In these two hypothetical-categorical syllogisms, we find that the antecedents have been affirmed in the minor premise, and in the conclusion, the consequent has been affirmed. Hence, the given dilemma is formally correct.

To take a concrete example of a Simple Constructive Dilemma:

If a man acts according to his own judgment, he will be criticised; and

If a man is guided by the opinion of others, he will be criticised—*Major premise.*

A man must act either according to his own judgment, or according to the opinion of others—*Minor premise.*

∴ In any case, he will be criticised.—*Conclusion.*

Resolved into simple hypothetical-categorical syllogisms, the above dilemma stands thus:

(1) If a man acts according to his own judgment, he will be criticised.
A man acts according to his own judgment.
∴ He will be criticised.

(2) If a man acts on the opinion of others, he will be criticised.
A man acts on the opinion of others.
∴ He will be criticised.

Thus, the above dilemma is formally correct, because, we have affirmed the consequent in the conclusions, by affirming the antecedents in the minor premises.

Similarly, if we analyse the examples of Complex Constructive Dilemma, Simple Destructive Dilemma, and Complex Destructive Dilemma given in Sec. 3B, we shall find they are all formally correct, because the rules relating to hypothetical-categorical syllogisms have been correctly followed. If these rules are not observed, the dilemma becomes formally incorrect. Hence, *the formal incorrectness of a dilemma is demonstrated by analysing the dilemma into its constituent hypothetical-categorical syllogisms and showing that the rules of the latter have been transgressed.*

Material Correctness of a Dilemma.

Material validity of a dilemma.

It is not enough that a dilemma is found to be formally correct. It must also be materially correct, *i.e.*, its premises must be true. In fact **dilemmatic arguments are more often fallacious than valid,** because they contain *material fallacies.* A dilemma is said to contain material fallacies, when the premises are false, as a matter of fact. If the premises are false, the conclusion drawn from them will also be false. Hence, it is necessary to determine whether a given dilemma is materially correct.

Three methods :

The material falsity of a dilemma may be proved in *three* ways:—

(1) The major premise may be found to be false *i.e.* to say, the consequents may not follow from the antecedents.

(1) *The major premise may be found to be false.*

The major premise of a dilemma consists of two hypothetical propositions. If, on examination, it be found that the consequents of these hypothetical propositions do not, *as a matter of fact,* follow from the antecedents, then clearly, the given major premise is materially false. The premise being false, the conclusion drawn from it must be false.

In the example of the Complex Constructive Dilemma given in Section 3B, the consequent, 'they are superfluous' may not follow from the antecedent, 'if the books are in conformity with the Koran'; for what good reasons are there to suppose that a book is superfluous, merely, because it is in conformity with the Koran? Similarly, the other hypothetical proposition, 'if the books are not in conformity with the Koran, they are pernicious', may equally be false, as a matter of fact. It is certainly possible that a book does not conform to the Koran and yet, it is not pernicious. Thus, the dilemma is proved to be false by showing that the major premise consists of two hypothetical propositions, which are both false.

We know that a man is said to be placed between 'the horns of a dilemma'. The dilemma is compared to an infuriated bull and the person against whom it is directed is compared to a victim who is impaled on one or other of the horns of the enraged animal. Now this form of proving the incorrectness of a dilemma is called **'taking the dilemma by the horns'.** The person, against whom the dilemma is directed, meets the attack directly by taking the bull by the horns, as it were, and proving by main force that it does not possess the strength, it pretends to possess.

(2) *The minor premise may be found to be false.*

(2) The minor premise may be false, *i.e.* to say the alternatives may not be mutually exclusive or complete

The minor premise of a dilemma is a disjunctive proposition. Two alternatives are offered and it is assumed that the opposition between the alternatives is complete and that no other possibility exists. If it be found that other possibilities exist and have been overlooked, then the minor premise is found to be false, as a matter of fact.

In the example of the Simple Constructive Dilemma given in Section 3B, the alternatives mentioned in the minor premise, 'A man must act, either according to his own judgment *or* according to the opinion of others' are not mutually exclusive at all. It is quite conceivable that a man's own judgment may, in some cases, be the same as the opinion of others. Hence, there is, as a matter of fact, no real opposition as is assumed in this disjunctive proposition.

This method of proving the material incorrectness of a dilemma, by showing that the alternatives are not complete or mutually exclusive, is called **"escaping between the horns of a dilemma."**

(3) The dilemma may be proved to be materially false by rebutting it.

(3) The third method of proving the material falsity of a dilemma is **to rebut the dilemma,** *i.e. to say, to offer a counter-dilemma, proving the very opposite conclusion.*

When a given dilemma is rebutted, and a counter-dilemma is formed by a slight manipulation of the given premises and it is found that with the greatest ease, it is possible to present equally unpleasant alternatives to the disputant presenting the dilemma, the weakness of the given argument is at once laid bare. It may be noted, however, that formal rebuttal does not conclusively prove the invalidity of the Dilemma rebutted.

In a preceding section, we have seen, how a given dilemma should be rebutted. The consequents of the major premise change places and their quality is changed.

Exercise XII.

1. Explain the nature of Conditional propositions.

What principle of thought is specially involved in them? Take the proposition, If S is P, Q is R, as major premise; supply the possible categorical minors, and show which of them lead to valid conclusions.

2. If A is true, B is true.
If C is true, B is not true.

Show what conclusion follows from these premises:

(*a*) If A is true, and
(*b*) If C is true.

State the rule involved in the drawing of each conclusion.

3. Answer the following :—

(*a*) An emperor is admirable, either for his military skill or for his political wisdom; Akbar was admirable for his political wisdom; therefore, he could not have been remarkable as a military leader. Examine this argument fully.

(*b*) A land army is unnecessary to an island country, for if its navy holds the sea, there is nothing for the army to do; and if its navy is driven from the sea, there is nothing that its army can do (to save the country from starvation). Characterise the reasoning here.

4. Explain the nature of a Disjunctive Proposition and a Disjunctive Syllogism, giving their rules and the reasons for them.

5. State the rules of the Hypothetical syllogism and mention the fallacies of Categorical syllogism to which, breaches of these rules correspond. Give the steps by which you arrive at your conclusion about this correspondence.

6. Explain and illustrate the following statement :—

Hypothetical and Disjunctive-categorical syllogisms are reduced to the forms of a categorical syllogism.

7. What are various kinds of Mixed syllogisms? Show that they are reducible to the forms of the Pure syllogism. Illustrate your answer by concrete examples.

8. Explain a disjunctive-categorical syllogism. What are its various forms and the rules of inference in each case?

Discuss the question fully, giving concrete examples, in illustration.

9. Explain the character of the Dilemmatic argument and the tests by which its validity can be determined. How is a Dilemma rebutted?

10. Distinguish between Pure and Mixed syllogisms, indicating their forms and tests.

11. Rebut the following dilemma:

If the emigrants are useless, they are a burden to the colonies; if they are useful, they are a loss to the mother country.

They are either useless or useful. Therefore, Emigration is either a burden to the colonies or a loss to the mother country.

12. (*a*) If a student is diligent, he passes the examination.
He passes the examination.
∴ He is diligent.
(*b*) If a person is guilty, he will be punished.
But he is not guilty.
∴ He will not be punished.

Reduce each of the above Hypothetical syllogisms to the categorical form and then test its validity as a categorical syllogism.

13. Enunciate the canon of Conditional Reasoning (of the Hypothetical-Categorical syllogisms) and show by examples that the violation of this canon leads to the fallacy of either *Illicit Major* or *Undistributed Middle.*

14. Construct a Dilemma to prove that money is useless. Comment on the following statement: "Dilemmatic arguments are more often fallacious than not."

15. Put the following argument into dilemmatic form and rebut it by forming a counter-dilemma :—

An escort is unnecessary, for if you are well received, it would be needless; and if not well received, it would raise suspicion.

16. Give the rules for testing the validity of conditional arguments. Rebut the following dilemma :—

If a pupil is fond of learning, he needs no stimulus; and if he dislikes learning, no stimulus would be of any avail. He is either fond of learning or he dislikes it. Therefore, a stimulus is either needless or of no avail.

17. Examine the following dilemma :—

If Logic deals with the matter of thought, it must either consider the whole of it, and then be identical with all science; or consider only a part of it without being able to give a reason why it should choose one part rather than another. But both of these alternatives are absurd. Therefore, Logic does not consider the matter of thought.

18. Define a Dilemma. Explain why dilemmatic arguments are more often fallacious than not. Rebut the following dilemma :—

If I cross the field, I shall meet the bull ; and if I go up the lane, I shall meet the farmer.

Either I must cross the field or go up the lane. Therefore, either I shall meet the bull or the farmer.

[**Hints.**—Rebutted, the dilemma stands thus :—

If I cross the field, *I shall not meet the farmer ;* and if I go up the lane, *I shall not meet the bull.* Either, I cross the field or go up the lane.

Therefore. either I shall not meet the farmer or I shall not meet the bull.]

19. How would you meet the following dilemma ?

If there is censorship of the Press, abuses which should be exposed will be hushed up ; and if there be no censorship, truth will be sacrificed to sensation.

But there must be either censorship or not.
∴ Either abuses which should be exposed will be hushed up or truth will be sacrificed to sensation.

20. Define a Dilemma, indicating its different forms. What is 'rebutting a dilemma'? Illustrate your answer by a concrete example.

21. What is a Mixed Syllogism, and what are its different forms ? Explain and exemplify the rules of Hypothetical-Categorical Syllogisms, noting the fallacies in each case that arise from the violation of these rules.

22. Explain with concrete illustrations the nature of a Disjunctive Syllogism. Consider its different forms mentioning the rules and the reasons for them.

CHAPTER XIII.

ABRIDGED SYLLOGISMS: ENTHYMEME.

Sec. 1. Enthymeme.

Enthymeme =abridged syllogism.

An Enthymeme is a syllogism with some of its constituent propositions suppressed.

A syllogism, when fully expressed in logical form, consists of three propositions, *viz.*, the major premise, the minor premise and the conclusion. In ordinary arguments, it is seldom that we find syllogisms fully expressed in their logical form. In fact, outside treatises on Logic, it is very rarely indeed that we come across fully expressed syllogisms. The tendency of the human mind is always to state explicitly no more than what is necessary for clearness, and fully expressed syllogisms appear to be needlessly pedantic. Hence, the most common forms, in which syllogisms are met with, are in the form of Enthymemes, in which some parts of the syllogism, which are obvious, are suppressed. Thus, *an Enthymeme means an incomplete or abridged syllogism.*

Four orders :— (*a*) 1st order :— Major suppressed.

Enthymemes are of *four* orders:

(*a*) *An Enthymeme is of the first order, when the major permise is omitted,* but the minor premise and the conclusion are fully stated. For example; 'Socrates is mortal, for he is but a man.' Fully expressed it would stand thus:

All men are mortal
Socrates is a man.
∴ Socrates is mortal.

Thus, in the above example, the major premise, 'All men are mortal', is suppressed. Hence it illustrates an Enthymeme of the first order.

(*b*) 2nd order :—Minor suppressed.

(*b*) *An Enthymeme is of the second order, when the minor premise is omitted.* For example: 'Socrates is mortal and so are all men.' In this case, the minor premise, 'Socrates is a man', is suppressed.

(*c*) 3rd order :—Conclusion suppressed.

(*c*) *An Enthymeme is of the third order, when the conclusion is omitted*, though both the premises are stated. For example: 'Man is mortal and Socrates is but a man'. Here, obviously the conclusion, 'Socrates is mortal', is not stated.

(*d*) 4th order :—Only one proposition, out of three, is stated and two propositions are suppressed.

(*d*) *An Enthymeme may be said to be of the fourth order, when a single proposition has a syllogistic force.* It may sometimes happen in course of a narrative or conversation, that only one proposition, either a premise or the conclusion, is stated, and other parts of the argument are suppressed, because, they are so obvious that they can easily be supplied from the context. When, for instance, Shakespeare said: 'Frailty, thy name is woman!' he was obviously referring to Hamlet's mother and this one sentence may be expanded into a complete syllogism thus:

All women are frail.
Gertrude is a woman.
∴ She is frail.

Or when there is a bereavement in the family of a friend, we seek to console him by saying, 'Alas! Man is but mortal!' we obviously mean that the person in question being a man, must die and this one exclamatory sentence may easily be expanded into a fully expressed syllogism. Similarly, when there is a judicial error, we say—After all, judges are human beings! or To err is human.

Exercise XIII.

1. What do you understand by the Enthymeme? Exhibit the different classes into which it may be divided and give a concrete example.

CHAPTER XIV.

COMPOUND SYLLOGISMS OR TRAINS OF REASONING: PROGRESSIVE AND REGRESSIVE.

Sec. 1. Progressive and Regressive trains of Reasoning.

A train of syllogistic reasoning.

A train of syllogistic reasoning is a combina- ion of two or more syllogisms, which are so connected with one another that they ultimately lead o a single conclusion. For example:—

(1) All B is C.
All A is B.
∴ All A is C.
(2) All C is D.
All A is C.
∴ All A is D.
(3) All D is E.
All A is D.
∴ All A is E.
(4) All E is F.
All A is E.
∴ All A is F.

n this example, the four syllogisms are connected in such a way that the conclusion of one becomes a premise of another, until the last conclusion, 'All A is ', is reached. This is called a *Train of Syllogism* or a **Polysyllogism.**

Prosyllogism and Episyllogism.

In a Polysyllogism or a train of syllogistic reason- ng, a syllogism, the conclusion of which is used as the premise of another, is called in relation to that other, a **Prosyllogism;** while a syllogism, one of whose premises is the conclusion of another syllogism, is called, in relation to that other, an **Episyllogism.**

They are relative terms.

It is quite clear that *the terms 'Prosyllogism' and 'Episyllogism' are purely relative.* The same syllogism may be at once a prosyllogism and an episyllogism, with reference to two different syllogisms in the train of syllogistic reasoning, in which it occurs. In the example given above, the second syllogism is an Episyllogism in relation to the first syllogism, and a Prosyllogism in relation to the third syllogism. Similarly, the third syllogism is an Episyllogism in relation to the second syllogism, and a Prosyllogism in relation to the fourth syllogism.

Episyllogistic train of Reasoning (from a prosyllogism to an episyllogism).

In the example of the train of syllogistic reasoning given above, we find the first syllogism is a prosyllogism in relation to the second, the second, a prosyllogism in relation to the third, the third, a prosyllogism in relation to the fourth, and thus the train of reasoning may be said to proceed from a prosyllogism to an episyllogism. Such a train of reasoning is called **Progressive, Episyllogistic or Synthetic.** Thus, *a Progressive train of syllogistic reasoning is a combination of two or more syllogisms, in which we proceed from a prosyllogism to an episyllogism.*

Prosyllogistic train (from an episyllogism to a prosyllogism).

On the other hand, *when the train of reasoning starts with an Episyllogism and passes on to a Prosyllogism, it is called a* **Regressive, Prosyllogistic** or **Analytic** *train of syllogistic reasoning.* The example given above, looked at in the opposite direction, will illustrate a Regressive train. Thus:

(1) All A is F.
∵ All E is F and
All A is E.

(2) All A is E.
∵ All D is E and
All A is D.

(3) All A is D.
∵ All C is D and
All A is C.

(4) All A is C.
∵ All B is C and
All A is B.

In this case, the first syllogism is an episyllogism relation to the second, because, a premise of the rst, *viz.*, 'All A is E', becomes the conclusion of the cond. Similarly, the second and the third syllogisms re episyllogisms in relation to the third and the fourth llogisms respectively. Thus, here the train passes on om an episyllogism to a prosyllogism and is, there-re, called Regressive, Prosyllogistic or Analytic.

Exercise XIV.

1. What is meant by a train of reasoning? Give a real ample. Distinguish between Progressive and Regressive ains, giving symbolical examples.

2. What do you understand by a Prosyllogism and an oisyllogism?

3. Explain and illustrate the following :—
Episyllogism and Prosyllogism.

CHAPTER XV.

Abridged Progressive Trains of Reasoning—Sorites: Abridged Regressive Trains of Reasoning—Epicheirema.

Sec. 1. Sorites.
Sec. 2. Kinds of Sorites.
Sec. 3. Rules of Sorites.
Sec. 4. Epicheirema.
Exercise XV.

Sec. 1. Sorites.

Sorites.

A Sorites is an abridged progressive train o syllogistic reasoning, in which the conclusions o all the prosyllogisms (and the correspondin premises of the episyllogisms), are omitted A Sorites is thus an *abridged progressive train* o syllogistic reasoning.

A Sorites, being a progressive train, proceeds fron a prosyllogism to an episyllogism. The prosyllogism and the episyllogisms, however, are not fully expressed the conclusions of the prosyllogisms and the corres-ponding premises of the episyllogisms are suppressed Thus, a Sorites is *a series of Enthymemes.* Fo example:

Symbolical example :—

All A is B.
All B is C.
All C is D.
All D is E.
All E is F.
∴ All A is F.

When fully expressed, this train would stand thus

(1) All B is C.
All A is B.
∴ All A is C.

(2) All C is D.
All A is C.
∴ **All A is D.**

(3) All D is E.
All A is D
∴ **All A is E.**

(4) All E is F.
All A is E.
∴ All A is F.

It is quite clear that the propositions (given in antique letters) which are conclusions of the prosyllogisms and the premises of the corresponding episyllogisms have been omitted in the Sorites given above.

Sec. 2. Kinds of Sorites.

There are two forms of Sorites, *viz.*, Aristotelian and Goclenian.

(*a*) **Aristotelian Sorites** is a form of Sorites in which the suppressed conclusions of the prosyllogisms form the *minor premise* of the corresponding episyllogisms; thus:

In Aristotelian Sorites, the suppressed conclusions form the minor premise of the next syllogism.

Symbolical Example.	*Concrete Example.*
All A is B.	Bucephalus is a horse.
All B is C.	A horse is a quadruped.
All C is D.	A quadruped is an animal.
All D is E.	An animal is a substance.
All E is F.	∴ Bucephalus is a substance.
∴ All A is F.	

If we fully express the above Sorites, we shall find that the suppressed conclusions of the prosyllogisms would form the minor premise of the corresponding episyllogisms. The symbolical example has been shown in a fully expressed form in the preceding section. The concrete example may be fully expressed thus:

(1) All horses are quadrupeds.
Bucephalus is a horse.
∴ **Bucephalus is a quadruped.**

(2) All quadrupeds are animals.
Bucephalus is a quadruped.
∴ **Bucephalus is an animal.**

(3) All animals are substances.
Bucephalus is an animal.
∴ Bucephalus is a substance.

In Goclenian Sorites, the suppressed conclusions form the major premise.

(*b*) **Goclenian Sorites** (so-called from *Goclenius*, 1547—1628) is a form of Sorites in which the suppressed conclusions of the prosyllogisms form the *major premise* of the episyllogisms thus:

Symbolical Example.	*Concrete Example.*
All E is F.	An animal is a substance.
All D is E.	A quadruped is an animal.
All C is D.	A horse is a quadruped.
All B is C.	Bucephalus is a horse.
All A is B.	∴ Bucephalus is a substance.
∴ All A is F.	

If we fully express the above Sorites, we shall find that the suppressed conclusions of the prosyllogisms would form the major premise of the corresponding episyllogisms. The symbolical example may be expanded into the following fully expressed form:

(1) All E is F.
All D is E.
∴ **All D is F.**

(2) **All D is F.**
All C is D.
∴ **All C is F.**

(3) **All C is F.**
All B is C.
∴ **All B is F.**

(4) **All B is F.**
All A is B.
∴ All A is F.

Similarly, the concrete example may be fully expressed as follows:

(1) All animals are substances.
All quadrupeds are animals.
∴ *All quadrupeds are substances.*

(2) *All quadrupeds are substances.*
All horses are quadrupeds.
∴ *All horses are substances.*

(3) *All horses are substances,*
Bucephalus is a horse.
∴ Bucephalus is a substance.

Thus we find that in Goclenian Sorites, the suppressed conclusions of the prosyllogisms form the major premise of the episyllogisms.

Aristotelian and Goclenian forms compared.

If we examine the two forms of Sorites, Aristotelian and Goclenian, we find that both forms contain the same premises and the same conclusion. They, however, differ in the following respects:

(*a*) *The Major term*: In Aristotelian Sorites, the predicate of the last premise is the major term, while in Goclenian Sorites, the predicate of the first premise is the major term.

(*b*) *The Minor term*: In Aristotelian Sorites, the first subject is the minor term, while in Goclenian Sorites, the last subject is the minor term.

(*c*) *Suppressed conclusions*: In Aristotelian Sorites, the suppressed conclusions of the prosyllogisms form the minor premise of the corresponding episyllogisms; while in Goclenian Sorites, the suppressed conclusions form the major premise of the corresponding episyllogisms.

(*d*) *Constituent premises*: In Aristotelian Sorites, the first premise is a minor premise and all the other premises are major premises. In Goclenian Sorites the first premise is a major premise and all the other premises are minor premises.

Sec. 3. Rules of Sorites.

Rules :

If the Sorites be entirely in the first figure, i.e. to say, if all the constituent syllogisms be in the first figure, the following rules hold good of both the Aristotelian and Goclenian forms:

Only one premise can be negative.

1. Only one premise can be negative, viz., the last in the Aristotelian form, and the first in the Goclenian form.

Proof: (*a*) *Only one premise can be negative, i.e., more than one premise cannot be negative.*

A negative premise leads to a negative conclusion, and hence, if more than one premise be negative, then ultimately one of the constituent syllogisms would contain two negative premises, yielding no conclusion whatsoever.

(*b*) *If any premise be negative at all it must be the last in the Aristotelian form, and the first in the Goclenian form.*

If any premise be negative, the last conclusion must be negative. If the last conclusion be negative, its predicate is distributed. Therefore, that premise, in which the predicate of the last conclusion is the predicate, must be negative. Now the premise, in which the predicate of the last conclusion is the prediate, is the last premise in the Aristotelian and the first n the Goclenian form.

If any other premise be taken as negative, it would ead to the fallacy of Illicit Major.

2. Only one premise can be particular, viz., he first in the Aristotelian, and the last in the Goclenian form.

Only one premise can be particular.

Proof: (*a*) *Only one premise can be particular .e. more than one premise cannot be particular.*

If one premise be particular, the conclusion will e particular; hence if more than one premise be particular ultimately one of the constituent syllogisms vould contain two particular premises, yielding no conclusion whatsoever.

(*b*) *If any premise be particular at all, it must be he first one in the Aristotelian form, and the last one n the Goclenian form.*

In Aristotelian Sorites, all the premises except the irst are major premises. Now, these rules apply to Sorites, only when all the constituent syllogisms are n the first figure. According to the special rules of he first figure, the major premise must be universal. Hence, only the first premise which is the minor premise may be particular.

In Goclenian Sorites, if any premise except the last were particular, the conclusion of the syllogism, in which such particular premise would occur, would be particular. Now in Goclenian Sorites the conclusion is the major premise of the next syllogism but in the first figure, the major premise must be universal. Hence in Goclenian Sorites, only the last premise can be particular.

If any other premise be taken as particular, i would lead to the fallacy of Undistributed Middle.

Sec. 4. Epicheirema.

Epicheirema—an abridged regressive train.

An Epicheirema is a condensed regressive train of syllogistic reasoning in which one premise of each prosyllogism is omitted.

An Epicheirema is a *regressive* (or analytical o prosyllogistic) train and hence in it, the reasoning proceeds from an episyllogism to a prosyllogism. It is a *condensed* train, one premise of each prosyllogism being suppressed. The episyllogism, however, is fully expressed. Thus, in an Epicheirema, the episyllogism is a fully expressed syllogism while the prosyllogisms are enthymemes.

Forms : (*i*) Simple and Complex

An Epicheirema may be either Simple or Complex. In a *Simple Epicheirema,* the premises of an episyllogism are proved by enthymemes. In a *Complex Epicheirema,* on the other hand, these enthymemes again are proved by other enthymemes.

(*ii*) Single and Double :

An Epicheirema may again be Single or Double. In a *Single Epicheirema,* one of the premises of an episyllogism is proved by an enthymeme. In a *Double Epicheirema,* on the other hand, both the premises of an episyllogism are proved by enthymemes.

Thus, there may be four kinds of Epicheirema, *viz., Simple Single, Simple Double, Complex Single,* and *Complex Double.* Let us take examples of each of them one by one.

Simple Single.

(1) Simple Single.

All A is B because, All X is B and All A is X.
All X is B because, All M is B.

Fully expanded, we have the following regressive train of reasoning:

Episyllogism :

All X is B.
All A is X.
∴ All A is B.

Prosyllogism :

All M is B.
All X is M.
∴ All X is B.

We find that a premise of the first syllogism 'All X is B' becomes the conclusion of the second syllogism and hence the argument here passes on from an episyllogism to a prosyllogism or in other words, it is a regressive train. As a premise of the prosyllogism was suppressed in the given example, it is an Epicheirema.

This epicheirema is *simple,* because the premise 'All X is B' of the episyllogism is proved by an enthymeme; and *single,* because one of the premises only is so proved and the other premise is not proved.

(2) Simple Double.

Simple Double.

All A is B because, All X is B and All A is X.
All X is B because, All M is B ; and
All A is X because, All A is Y.

This is *simple,* because the premises of the episyllogism are proved by enthymemes and *double* because both the premises have been so proved. The first enthymeme proves the major premise 'All X is B' and the second enthymeme proves the minor premise 'All A is X'. This may also be expanded into a fully expressed regressive train thus:

Episyllogism :

All X is B.
All A is X.
∴ All A is B.

Prosyllogisms :

(*i*) All M is B.
All X is M.
∴ All X is B.
(*ii*) *All Y is X.*
All A is Y.
∴ All A is X.

It is quite clear that the first prosyllogism proves the major premise while the second prosyllogism proves the minor premise. The premises given in italics were suppressed.

Complex Single.

(3) Complex Single.

All A is B because, All X is B and All A is X.
All X is B because, All M is B ; and
All M is B because, All N is B.

This epicheirema is *complex*, because firstly, a premise of the episyllogism is proved by an enthymeme and then a premise of the enthymeme is again proved by another enthymeme; it is *single,* because only one premise of the episyllogism is concerned. The other premise 'All A is X' is not proved.

Complex Double.

(4) Complex Double.

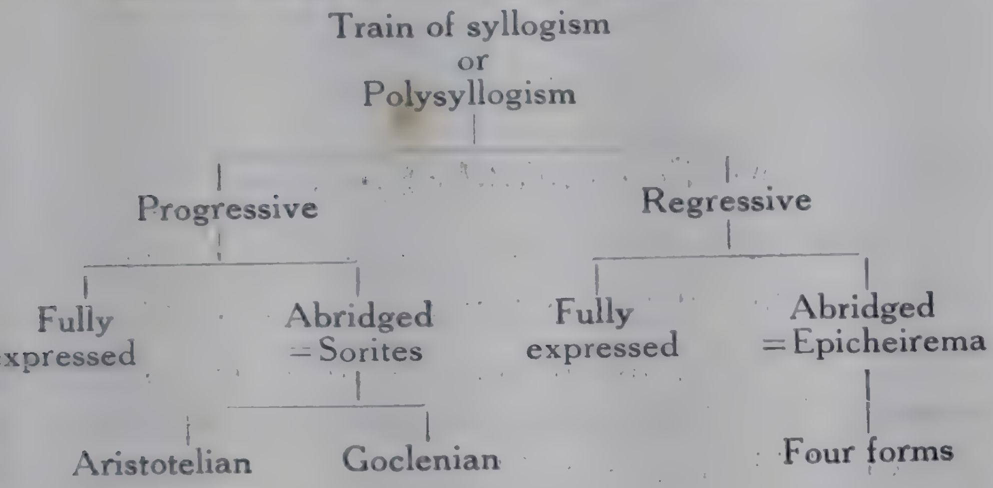
All A is B because, All X is B and All A is X.
All X is B because, All M is B ; and
All M is B because, All N is B.

and again,

All A is X because, All C is X ; and
All C is X because, All D is X.

This is an example of a *complex double* epicheirema, because, both the premises of the episyllogism are proved by enthymemes and the premises of these enthymemes again, are proved by other enthymmes.

TE : The following **Table** exhibits the classification of different forms of trains of syllogistic reasonings :—


Train of syllogism
or
Polysyllogism
Progressive
Regressive
Fully
xpressed
Abridged
=Sorites
Fully
expressed
Abridged
=Epicheirema
Aristotelian
Goclenian
Four forms

Exercise XV.

1. Give a Sorites of the Aristotelian form (symbolical) d break it up into its constituent simple syllogisms. Show at in a train of this kind all the premises except the first ust be universal.

2. What is an Epicheirema? Give its different forms ith an example of each.

3. Distinguish between Aristotelian and Goclenian Sorites d prove the rules of the former.

4. Distinguish between
    (*a*) Sorites and Epicheirema.
    (*b*) Goclenian and Aristotelian Sorites.

5. State and explain the rules of Sorites.

6. What do you understand by a Sorites? Explain and stinguish its two forms. Take a Sorites consisting of five nnected propositions and break it up into its constitutent rosyllogisms and episyllogisms.

7. Prove that in a Sorites, only one premise can be egative, *viz.*, the last in the Aristotelian and the first in the oclenian.

CHAPTER XVI.

MILL'S OBJECTIONS TO THE SYLLOGISM.

Sec. 1. Mill's twofold objection.

Mill's objections :—

Mill urges the *two* following objections against th syllogism considered as a mode of argument:

I. First objection : —Syllogism is not the process by which we reason.

I. Firstly, according to Mill, **the syllogist process is not the process according to which w reason.** "All inference" he says "is from particula to particulars: General propositions are merely registe of such inferences already made, and short formul for making more: The major premise of a syllogis consequently, is a formula of this description; and th conclusion is not an inference drawn *from* the formul but an inference drawn *according* to the formula."

Mill however does not go the length of holdin that the syllogism is useless for the purposes of reason ing. According to him, the value of the syllogis "does not consist in its being the form according t which our reasonings are necessarily, or even usuall made; but in its furnishing us with a mode in whic those reasonings may always be represented, and whic is calculated, if they are inconclusive, to bring thei inconclusiveness to light."

Thus, Mill holds that the syllogism is not the usu form of argument but is only useful as a test t examine the validity of doubtful instances of reason ing. This view of the syllogism was accepted b **Herschel, Whewell, Bain** etc.

Criticism.

Criticism: There are certain other logician however, such as **Mansel, De Morgan, Martineau**

. P. K. Ray, Sir W. Hamilton etc., who strongly pose the above-mentioned view. The following ints have been urged:

(*a*) Mill's contention, that the syllogism is not the ocess by which we *usually reason*, is true. But it is ually true, that our usual reasonings will not be valid, less they are capable of being reduced to the syllogis- form. Mill seems to make a confusion between the siness of Psychology and that of Logic. It is not e business of Logic to give an account of the various ocesses by which people actually reason, correctly incorrectly, but to give an account of the processes which people *ought* to reason and *must* reason, if ey wish to reason correctly. While Psychology deals th reasonings as they actually are, Logic deals with em as they should be: Mill confuses these two and akes both the business of Logic. Hence, the view, at the syllogism is *not the usual process of reasoning,* es not in any way detract from the value of the llogism so long as the syllogism is recognised to be *e type of valid reasoning.*

(*a*) Mill makes a confusion between the business of Logic and that of Psychology.

(*b*) Again, Mill's statement that "All inference is om particulars to particulars" has been challenged. 'e frequently do reason by analogy from particulars particulars but it is somewhat extravagant to claim at "it is the universal type of the reasoning process." ich arguments are often fallacious but when they e valid, are they not really based upon the *universal ment* in the particulars? We are justified in ssing from particulars to particulars only because ere is an element of resemblance—only by virtue of discovery of some general law which binds the rticulars together. Thus, "Whenever we reason om resemblance, we reason from that which is the

(*b*) Besides as a matter of fact, we reason from one particular to another particular because there is a universal element in them.

same in several particulars and is itself not a particular.' As **Welton** sums up: "Even in cases wher the inference is apparently founded on one or mor particular experiences, it is really based on the universal element in which they agree; and this may b expressed in a general proposition which forms th major premise of a syllogism."

II. Second objection : Charge of *petitio principii.*

II. The second objection of Mill is that **"i every syllogism, considered as an argument, ther is a petitio principii."**

The fallacy of *petitio principii* is committed when th conclusion itself is assumed in the premise or premises. It i also called "*Begging the Question*" or "*Arguing in a circle.* To take a simple example: Men are mortal because they ar subject to death.

Thus if we say that every syllogism involves th fallacy of *petitio principii,* we deny the very validit of the syllogism. Strictly speaking, this should mea that the conclusion of every syllogism is itself assume as one of the premises; but more loosely, it is held t imply that the premises presuppose the truth of th conclusion and cannot therefore be used to establis it. For example, it is said that in the syllogism, "A men are mortal, A is a man, therefore, A is mortal, the conclusion "A is mortal" is already assumed i the premise "All men are mortal".

Criticism : (*a*) The Universal major premise is not a mere summation of particulars observed.

Criticism: (*a*) This view of the syllogism is base on the supposition that the universal major premise i a mere summation of particular instances. If a universal proposition be regarded as a mere summary o examined particulars, this objection becomes vali But in a vast majority of cases, universal proposition are established on the strength of an examination of small number of instances, on the basis of the Laws o

Uniformity of Nature and Causation. If the universal proposition is established on an examination of all the particulars coming within its sweep, it is known as Perfect Induction. But besides, the so-called Perfect Induction, there is Scientific Induction, in which universal propositions are established, before all the instances, which come under it, have been examined or are indeed known. For example, the universal proposition "All men are mortal" could not possibly have been established on an examination of all men—those who are living, being necessarily excluded. Hence, if we draw the inference that "the present President of the United States is mortal" from the above universal proposition, the conclusion cannot in any sense be held to be assumed in the premise.

(*b*) The conclusion follows from both the premises taken together.

(*b*) Again, a syllogism requires the combination of *both premises*—the major and the minor but the objection we are considering involves the tacit assumption that the minor premise is unnecessary. The fact, however, is that the conclusion follows from both the premises taken jointly, and not from any one premise singly. Thus, the necessity of the minor premise is a proof that the syllogism is not a *petitio principii*.

(*c*) In a syllogism, what is implicit is made explicit— hence there is advance in knowledge.

(*c*) If the syllogism were really open to the charge of *petitio principii*, it would follow that no advance could be made in knowledge by its means. In a syllogism it may be said that the truth of the conclusion is contained in that of the premises but our knowledge of the conclusion comes after our knowledge of the premises. In other words, the conclusion may be implicitly contained in the premises but we know it was so contained, only when we explicitly deduce the conclusion from the premises. This *passing from what was implicit to explicit knowledge* certainly constitutes an advance in knowledge. Hence when the conclusion is drawn, there is advance in knowledge.

(*d*) Mill's objection is not a logical objection.

(*d*) Lastly, even were this objection true, it would be a psychological, not a logical objection. A proof does not cease to be proof because it is familiar to some individual minds. The conclusions of Geometry, for example, do not cease to be inferences, because, the process of reasoning is understood and remembered by a particular person.

Thus, the charge of *petitio principii* fails and the validity of the syllogism, as a mode of argument, is established.

The other extreme view should also be avoided.

It may however be noted that in establishing the validity of the syllogism, some logicians go to the other extreme and maintain that "the Syllogism is the *only* type of valid reasoning." This is the view of **Whately.** This claim is obviously extravagant, because, the syllogism deals only with propositions which express the relation of subject and attribute and that inferences from other relations of subject cannot be satisfactorily expressed in the form of a syllogism.

Exercise XVI.

1. 'The charge against the syllogism that it involves a *petitio principii* is founded on a misunderstanding.' Explain the nature and supposed warrant for this charge and the misunderstanding on which it is founded.

2. What is meant by *petitio principii*? Give an example. On what ground has it been argued that the syllogism involves a *petitio principii*? Do you consider the argument to be sound? Give reasons.

3. Does the syllogism really extend our knowledge? Fully discuss the question.

4. Explain and examine the objection of Mill that the syllogism as a mode of argument involves the fallacy of *petitio principii*.

5. It has been asserted that the conclusion of a syllogism is drawn, not from, but according to, the major premise. Discuss the statement.

6. Must all inference be from particular to particular?

7. Examine the contention that the syllogism in fact assumes what it pretends to prove.

CHAPTER XVII.

FALLACIES IN DEDUCTIVE REASONING.

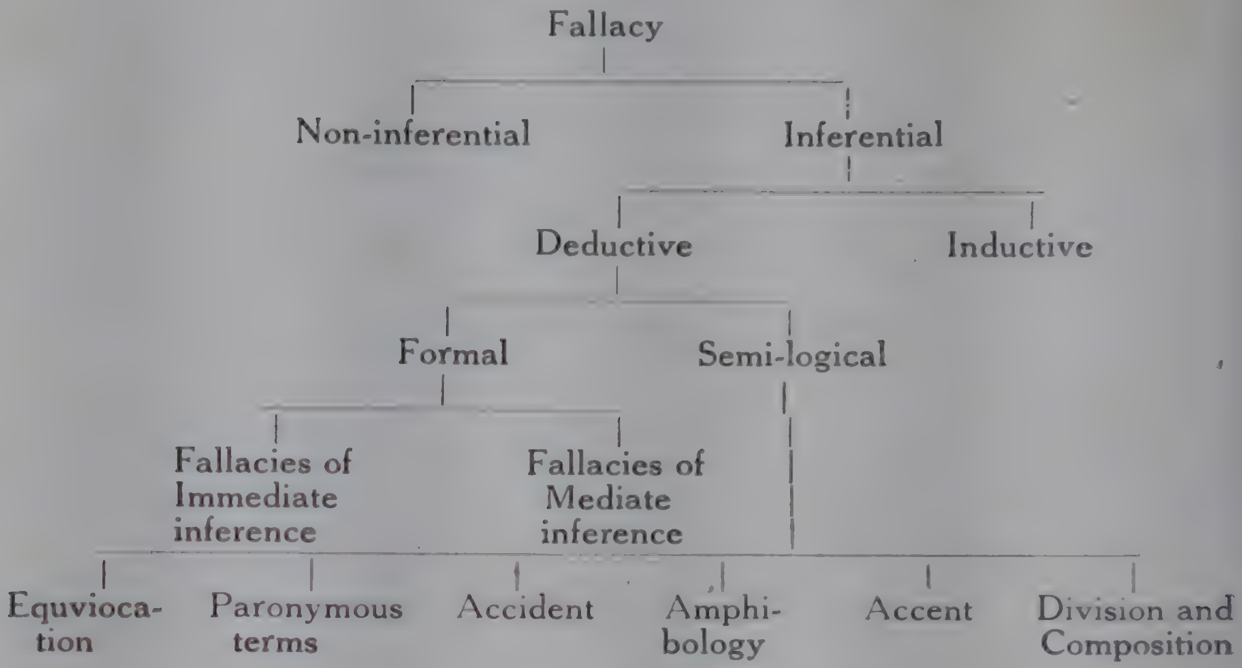
SEC. 1. Definition of Fallacy : its classification.
SEC. 2. Deductive Fallacies.
    I.—Formal Inferential Fallacies—Fallacies of Immediate inference and Mediate inference.
    II. Semi-logical Fallacies.
        (1) Equivocation.
        (2) Paronymous Terms.
        (3) Accident.
        (4) Amphibology.
        (5) Accent.
        (6) Division and Composition.
        Exercise XVII.

Sec. 1. Definition of Fallacy : its Classification.

Fallacy, ordinarily, means error or confusion and some writers on Logic use this word in this comprehensive sense, to include any kind of error or confusion whatsoever. It is, however, customary to restrict the use of the word to mean **a violation of the rules and principles of Logic.** As we know, Logic deals with the principles which regulate valid thinking and hence, wherever there is a rule, there is a possibility of its violation, leading to a fallacy. Thus, fallacies are as numerous as the rules themselves.

Fallacy means violation of logical rules.

Fallacies may be classified according to the following **Table:—**


Fallacy
Non-inferential
Inferential
Deductive
Inductive
Formal
Semi-logical
Fallacies of Immediate inference
Fallacies of Mediate inference
Equvioca-tion
Paronymous terms
Accident
Amphi-bology
Accent
Division and Composition

Fallacies may be connected with Inferences or not. **Non-inferential fallacies** include violation of the Rules of Definition and the Rules of Logical Division. *Fallacies of Definition* are the following:

(*a*) Redundant definitions ;
(*b*) Accidental definitions ;
(*c*) Too wide and too narrow or Incomplete definitions ;
(*d*) Obscure and Figurative definitions ;
(*e*) Synonymous definitions ; and
(*f*) Negative definitions.

Fallacies of Logical Division are the following:

(*a*) Metaphysical analysis or Physical Partition ;
(*b*) Cross division ;
(*c*) Incomplete or too narrow division ;
(*d*) Too wide division ; and
(*e*) Overlapping division.

As these fallacies have been exhaustively dealt with in their respective chapters, no separate treatment is called for.

Coming to the classification of **Inferential fallacies,** it is clear that as inference may be deductive r inductive, there are two main divisions of Inferential allacies. Inductive (inferential) fallacies need not be lealt with in Deductive Logic in which we shall conine ourselves to Deductive (inferential) fallacies.

Sec. 2. Deductive Fallacies.

Deductive Fallacies.

The two main divisions of Deductive Fallacies are:

I. Formal Inferential fallacies; and
II. Semi-logical fallacies.

I. Formal Inferential Fallacies.

I. Formal Inferential fallacies

These include fallacies of Immediate and Mediate nferences.

. Fallacies of Immediate Inference.

of Immediate and

We have considered nine forms of Immediate Inference, iz., Conversion, Obversion, Contraposition, Inversion, Opposiion, Change of Relation, Modal Consequence, Inference by Added Determinants and Inference by Complex Conception. Each of these forms has got definite rules, the violation of which will lead to fallacies. These have been fully dealt with n their respective places.

. Fallacies of Mediate Inference.

Mediate inference.

Mediate Deductive Inference, as we have seen, includes ure and Mixed syllogisms and Trains of syllogistic reasoning. hese forms of argument are governed by definite rules which old good in their respective spheres, *e.g.*, the general syllogistic ules, the rules of Hypothetical-Categorical Syllogism, Dilemma, ne rules of Progressive and Regressive trains of reasoning, ne rules of Sorites, Epicheirema, etc.

As these fallacies have been treated of fully in their spective places, no separate treatment is necessary.

II. Semi-Logical Fallacies.

II. Semi-Logical fallacies :—

Semi-Logical Fallacies are distinguished from ormal fallacies in this that these errors cannot be detected from the mere form of the argument but they **are due to the ambiguity of language.** These fallacies are of various forms:

Equivocation.

1. Fallacy of Equivocation.

We know that a syllogism must consist of three terms and three terms only, and no term should be ambiguous. As there are three terms—each of them may be subject to this fallacy. Thus there may be fallacies of *Ambiguous Middle, Major or Minor Terms.* This fallacy is similar to the Fallacy of Four terms and has been fully treated of in the chapter on Syllogism. (Ch. XI, Sec. 7).

Parnonymous Terms.

2. Fallacy of Figure of Speech or Fallacy of Paronymous Terms.

By **Paronymous terms,** we mean, words related to each other as the substantive, adjective, verb etc., of the same root. The fallacy of Paronymous terms occurs because we take for granted that paronymous terms have the same meaning but as a matter of fact, their meanings are often found to be substantially different, *e.g.*, scheme—scheming; project—projector; presume—presumption; apprehend—apprehensive etc. Let us take the following examples: —

(1) *Projectors* should not be trusted.
The Engineer has *formed a project.*
∴ The Engineer should not be trusted.

(This argument involves *the fallacy of Paronymous Terms,* because, the term 'project' means a 'plan,' whereas, 'projector' means a 'promoter of questionable schemes').

(2) *Murder* should be punished with death.
This man is a *murderer.*
∴ He deserves to die.
(This is correct.)

(3) To be acquainted with the guilty is a *presumption* of guilt.
This man is so acquainted.
∴ We *presume* that he is guilty.

(Fallacious—*presumption* means slight suspicion and *resume* amounts to absolute belief.)

(4) No *designing* person should be trusted.
Engravers are by profession *designers.*
∴ Engravers ought not to be trusted.

(*Designing* and *Designers* mean different things).

Fallacy of Accident.

Accident.

The Fallacy of Accident consists in taking the iddle term without any condition in one premise and ubject to some condition in the other premise; or in aking the middle term with different conditions, in the wo premises. Examples:

(1) Whoever *kills* another should suffer death.
A soldier *kills* his enemy.
∴ A soldier should suffer death.

[This argument involves *the fallacy of Accident* because e middle term 'killing' is subject to the condition 'in times war' in the minor premise while in the major premise, it is bject to the condition 'in ordinary circumstances'.]

(2) *Water* is a liquid substance.
Ice is *water.*
∴ Ice is a liquid substance.

(3) What we *eat* grow in the fields.
Loaves of bread are what we *eat.*
∴ Loaves of bread grow in the fields.

(4) What is *bought in the market* is eaten.
Raw meat is *bought in the market.*
∴ Raw meat is eaten.

(5) *Nuisances* are punishable by law.
To keep a noisy dog is a *nuisance.*
∴ To keep a noisy dog is punishable by law.

(6) *Interference with another's business* is illegal.
Competition is *interference with another's business*
∴ Competition is illegal.

(7) *To call you an animal* is to speak truly.
To call you a monkey is *to call you an animal.* . . .
∴ To call you a monkey is to speak truly.

(8) *He who calls you a man* speaks truly.
He who calls you a fool *calls you a man.*
∴ He who calls you a fool speaks truly.

Amphi-bology.

4. Fallacy of Amphibology.

The fallacy of Amphibology or Amphiboly lies i the ambiguous construction of a sentence. An amphibolous sentence is one which is capable of more than one construction and is thus ambiguous. More than one meaning is possible and it is impossible to ascertain which meaning, the sentence is intended to convey *e.g.*, Alexander Darius will conquer. It is impossible to say whether this means that Alexander will conquer Darius, or Darius will conquer Alexander. Similarly the sentence, 'The Duke yet lives that Henry shall depose,' involves the fallacy of Amphibology because it is not clear whether Henry shall depose the Duke or the Duke shall depose Henry. (*Shakespeare—Henry VI*).

Accent.

5. Fallacy of Accent.

This fallacy arises from placing the accent o emphasis on the wrong expression in a sentence. Fo example:

Thou shalt not bear false witness against thy neighbour.

The meaning of this may be perverted by placing the emphasis on the word, 'against,' as if one may bear false witness *for* or in the interests of one's neighbour or by placing the emphasis on the word 'neighbour,' as if one may bear false witness against *others*.

6. Fallacy of Division and Composition.

Division and Composition.

If we proceed *from the collective to the distributive* use of a term we have the **Fallacy of Division.** The converse fallacy, called the **Fallacy of Composition,** arises if we proceed *from the distributive to the collective* use of a term.

Examples of the Fallacy of Division

(1) All the works of Shakespeare cannot be read in a day.
The play of Hamlet is a work of Shakespeare.
∴ Hamlet cannot be read in a day.

(2) The people of this country are suffering from famine.
You are one of the people.
∴ You are suffering from famine.

(3) The Ancient Greeks produced the greatest masterpieces of Philosophy.
The Lacedæmonians were ancient Greeks.
∴ The L's produced the greatest masterpieces.

(4) The French are a polished people.
M. Blanc is a Frenchman.
∴ M. Blanc is a polished person.

(5) I remember what I have read.
I have read every line of Homer.
∴ I remember every line of Homer.

(6) The learned are pedants.
A is learned.
∴ A is a pedant.

(7) The inhabitants of the town consist of men, women and children of all ages.
Those whom I met in the Town Hall were inhabitants of the town.
∴ Those whom I met in the Town Hall consisted of men, women and children of all ages.

(8) The Judges of the Court of Appeal cannot misinterpret the law.
Lord A. B. is a judge of the Court of Appeal.
∴ Lord A. B. cannot misinterpret the law.

(9) Thirteen is one number.
Six and Seven are thirteen.
∴ Six and Seven are one number.

(10) The Jury found him guilty.
You were a member of the Jury.
∴ You found him guilty.

Examples of the Fallacy of Composition.

(1) Of the five members of the Jury, not one is intelligent enough to judge correctly.
∴ The Jury cannot judge correctly.

(2) Neither A nor B nor C is strong enough to lift this load.
∴ A, B and C cannot lift this load.

(3) Every man desires his own happiness.
∴ All men desire universal happiness.

(4) Five and Eight are odd and even.
Thirteen is Five and Eight.
∴ Thirteen is odd and even.

Hints for working out Exercises on Fallacies with Typical Examples.

The examination of concrete arguments with a view to detecting fallacies, if any, in them is a subject which presents considerable difficulties to the students in the initial stages and some general hints as to how the students should approach the question will not be out of place.

The principal reason why the subject provides a stumbling-block to the beginner is that outside treatises on Logic, it is seldom that an argument is given in its strict logical form. Hence the first step in examining a given argument is to reduce it to the strict logical form, by introducing such changes as may be necessary in the different propositions constituting the argument, without any material change in their meaning. Here we shall confine ourselves exclusively to Fallacies of Syllogisms, in their different forms.

In reducing a syllogism to its logical form, the following rules should be followed :—

1. Firstly, *find out the conclusion of the syllogism.*

The conclusion of a syllogism in its logical form should e the third proposition but in the given argument it may ot be in its proper place. The conclusion is introduced by uch words as, 'therefore,' 'so,' 'hence,' etc. ;while premises re introduced by such words as 'for,' 'because,' etc. Having ound the conclusion, reduce it to strict logical form, and nderline the copula, in order that the subject and the predicate ay stand out clearly.

2. Secondly, *find out the major and the minor premises.*

When the conclusion is in logical form, the predicate is he major term, therefore, that proposition in which the predi- ate of the conclusion occurs is the major premise ; again, the ubject of the conclusion being the minor term, that proposition n which the subject of the conclusion occurs is the minor remise. Reduce both the major and minor premises to their trict logical form, underlining the copula so that their respec- ive subjects and predicates may not get confused.

3. Lastly, *arrange the propositions in regular order.*

More often than not it happens that the syllogism is an nthymeme, with some parts suppressed. If the conclusion be iven, there should be no difficulty in finding out whether the iven premise is the major premise or the minor premise. If he major premise is given, the minor premise should be upplied ; if the minor premise is given the major premise hould be supplied. Suppose the major premise is given and he minor premise is to be supplied. We want the minor term nd the middle term. The subject of the conclusion is the inor term and that term in the major premise which is not he major term is the middle term. When we thus have the inor and the middle terms, we may have the minor premise. s regards the mood (*i.e.*, quantity and quality of the sup- ressed premise), and its figure (*i.e.*, the position of the middle erm in relation to the other) we may take it any way we like.

Now having reduced the given argument to its strict logical rm, we have to examine whether the rules of syllogism have een observed or not, and whether there is any ambiguity in he meaning of the terms. In the former case, we have a rmal fallacy, such as the fallacies of the *Undistributed Middle*, he *Illicit Process*, etc. ; in the latter case, there would be a mi-logical fallacy, such as the fallacies of *Equivocation*, *aronymous terms*, etc.

So far as the general syllogistic rules are concerned, the ost important rules, from the purely formal point of view, re the rules regarding the distribution of the three terms of a llogism. (Rules 3 and 4 of the General Syllogistic Rules). rom the point of view of Semi-logical fallacies, the first general llogistic rule according to which in a syllogism there should three and only three terms is very important.

The student will remember that an instance given fo examination is not necessarily fallacious.

Let us take the following typical examples. The studen will notice that it is not enough to mention the name of th fallacy though that must be done ; it is necessary to state wh a particular argument involves a particular fallacy. The reaso for the error must be clearly stated.

1. Examine the following argument:

John can pass the examination, for he is ar intelligent boy and intelligent boys alone can pas the examination.

Answer. In this case, the conclusion is 'John can pas the examination'. Reduced to strict logical form, it stand as 'John *is* a boy who can pass the examination.' It is ar A proposition because it is affirmative and the subject is definite singular term, taken in its entire denotation.

Now, it is clear that 'John,' the subject of the conclusion is the minor term ; therefore, that proposition in which th word 'John' occurs is the minor premise, *viz.*, 'He (*i.e.*, John) *is* an intelligent boy.' This is in logical form, and is an A proposition.

The other proposition in which the predicate of the conclusion, *viz.*, 'boy who can pass the examination' occurs is the major premise. The given proposition, 'Intelligent boys alone can pass the examination' is not in logical form ; it is an exclusive proposition and reduced to strict logical form stands as 'All boys who can pass the examination *are* intelligent boys.' This is an A proposition.

Thus the given argument when reduced to logical form stands as follows :—

All boys who can pass the examination *are* intelligent boys.
John *is* an intelligent boy.
∴ John *is* a boy who can pass the examination.

Now we find that the middle term 'intelligent boy' (it is the middle term because it occurs in both the premises but is absent from the conclusion) is not distributed even once in the premises. The rules of syllogism, however, require that the middle term should be distributed at least once in the premises. As the given argument involves the violation of this rule o syllogism, we have the *fallacy of Undistributed Middle.*

2. Examine the following argument:

This substance cannot be gold, for it is not malleable.

Answer. This is an enthymeme, for there are only two propositions, instead of three.

The conclusion is 'This substance cannot be gold' which reduced to strict logical form stands as 'This substance *is not* something which can be gold.' This is an E proposition, because there is the sign of negation and the subject is a definite singular term. (The student will note that the sign of negation is attached to the copula.)

The given premise 'It is not malleable' is the minor premise, because, the subject of the conclusion 'this substance' occurs in it in the form of the pronoun "It." Reduced to its logical form, it stands as 'This substance *is not* gold.' This is an E proposition.

Now we want the major premise. In the major premise, there are the major and the middle terms. The major term in this argument is 'gold,' being the predicate of the conclusion. The middle term is 'malleable' because this is the term which occurs in the minor premise and is not the minor term. Now that we have got the major and the middle terms, we may have any proposition we like, provided it contains both these terms. Suppose we take the proposition 'Gold is malleable,' as the major premise, we have the following syllogism :—

Gold *is* malleable.
This substance *is not* malleable.
∴ This substance *is not* gold.

This argument is quite correct, being in *Camestres*, a valid mood in the second figure.

3. Examine the following argument:

Whoever intentionally thrusts a knife into another's person is punishable by law; a surgeon in operating does so; he is therefore punishable by law.

Answer. Obviously, the proposition 'He is punishable by law' is the conclusion. The pronoun 'he' stands for 'a surgeon in operating'. Therefore, the logical form of the conclusion is 'All surgeons in operating *are* punishable by law'.

The proposition 'A surgeon in operating does so' is the minor premise, because the subject of the conclusion occurs in it. Reduced to logical form, it stands as "All surgeons in operating *are* persons who intentionally thrust a knife into another's person."

Now, the remaining proposition is the major premise, because, the predicate of the conclusion occurs in it. Reduced to logical form, it stands as 'All persons who intentionally thrust a knife into another's person *are* punishable by law.' Hence the logical form of the argument is this :—

All persons who intentionally thrust a knife into another's person *are* punishable by law.
All surgeons in operating *are* persons who intentionally thrust a knife into another's person.
∴ All surgeons in operating *are* punishable by law.

On an examination of the argument, thus reduced to logical form, we find that there is no formal fallacy, because all the rules of syllogism have been observed. But this involves a semi-logical fallacy called the *fallacy of Accident*, because the middle term "all persons who intentionally thrust a knife into another's person" is subject to different conditions in the two premises. In the major premise we assume that those who intentionally thrust a knife into another's person do so in order to hurt the latter; while in the minor premise, the surgeon does so to cure him.

4. Examine the following argument:

The cat must be away, since the mice are playing about; for when the cat is away, the mice will play.

Answer. Obviously, the proposition "The cat must be away" is the conclusion. The other two propositions are premises, introduced by words 'since' and 'for.' Now on examining the premise, 'When the cat is away, the mice will play,' we find it is a hypohtetical proposition, 'when' being an equivalent of 'If'. The other proposition is categorical. Therefore, it is an instance of a Hypothetical-categorical syllogism, in which the major premise is hypothetical, the minor premise is categorical, and the conclusion is categorical. Reduced to logical form, it stands thus :—

If the cat is away, the mice play about.
The mice are playing about.
∴ The cat is away.

This is fallacious, involving the *fallacy of affirming the consequent*, because we have affirmed the consequent in the minor premise and on the strength of that, affirmed the antecedent in the conclusion, but this is not warranted by the rules.

Imp

5. Examine the following argument:

The General rules the army; the General's wife rules the General; therefore, the General's wife rules the army.

Answer. Reduced to strict logical form, the argument stands as follows :—

The General *is* a person who rules the army.
The General's wife *is* a person who rules the General.
∴ The General's wife *is* a person who rules the army.

This argument involves the *fallacy of Four Terms*, because, in this apparent syllogism there are four terms instead of three terms, *viz.*, (1) the General, (2) a person who rules the army, (3) the General's wife and (4) a person who rules the General.

6. **Examine the following argument:**

The end of life is its perfection; death is the end of life; therefore, death is the perfection of life.

Answer. This argument involves the *fallacy of Ambiguous Middle*, because the apparent middle term "the end of life" is ambiguous. It means "the ideal of life" in the major premise while in the minor premise, it means the "termination of our physical existence."

7. **Examine the following argument:**

None but the truthful are honest, none but truthful men are worthy of respect; therefore, all men who are worthy of respect are honest.

Answer. Reduced to logical form, the syllogism stands thus :—

A. All honest men *are* truthful.
A. All men who are worthy of respect *are* truthful.
∴ A. All men who are worthy of respect *are* honest.

This syllogism involves the *fallacy of Undistributed Middle*, because, the middle term 'truthful' has not been distributed even once in the premises.

8. **Examine the following argument:**

Only material bodies gravitate, and light does not gravitate.

Answer. This enthymeme may be expanded in the following syllogism by supplying the suppressed conclusion :—

A. All gravitating bodies *are* material bodies.
E. Light *is not* a gravitating body.
∴ E. Light *is not* a material body.

This argument involves the *fallacy of Illicit Major*, because the major term 'material body' is distributed in the conclusion without being distributed in the major premise.

Exercises Worked Out.

1. *State the following arguments in Figure and Mood and determine whether they are valid or not :*

(a) It is impossible that thought can be a function of matter, because all the functions of matter are modes of motion, which thought is not.

Answer. Reduced to logical form, it stands thus :—

Major Premise. All functions of matter are modes of motion.
Minor Premise. No thought is a mode of motion.
Conclusion. No thought is a function of matter.
This is a valid mood in the second figure, called Camestres.

(*b*) *Beggars, who have no property, can receive no injustice, because injustice is nothing but violation of property.*.

Answer. Reduced to logical form, it stands thus :—

No persons without property *are* persons who can receive injustice.
All beggars *are* persons without property.
∴ No beggars *are* persons who can receive injustice.

This is formally correct, being Celarent in the first figure; but the major premise is materially false, because not only property but life also requires protection and when such protection is not forthcoming, there may be injustice.

(*c*) *The formal study of Logic is useless, for many persons who have never studied Logic can reason shrewdly and accurately.*

Answer. Reduced to logical form, it stands thus :—

Major Premise. All persons who can reason shrewdly and accurately, without study of Logic, *are* cases which prove that the formal study of Logic is useless.

Minor Premise. Some cases *are* persons who can reason shrewdly and accurately without study of Logic.

Conclusion. Therefore, some cases *are cases* which prove that the formal study of Logic is useless.

This is Darii, a valid mood in the first figure but this conclusion can only mean that in some cases the formal study of Logic is useless, whereas, the conclusion sought to be drawn in the given example is that in all cases the formal study of Logic is useless—which is obviously wrong. The conclusion cannot be an A proposition, when one of the premises is an I proposition.

(*d*) *Some of Galileo's contemporaries argued : There can be no truth in Galileo's assertion that Jupiter has moons, because they are invisible to men and can, therefore, have no bearing on the interests of mankind, and there can be nothing in this world that has not some relation to man.*

Answer. This is a train of syllogistic reasoning, some propositions of which are suppressed. When fully expressed it stands thus :—

1st Syllogism—

A. All invisible things *are* things which can have no bearing on the interests of mankind.

A. All the supposed moons of Jupiter *are* invisible things.
∴ A. All the supposed moons of Jupiter *are* things which can have no bearing on the interests of mankind.

2nd Syllogism—
E. No things which have not some relation to man *are* existing.
A. All the supposed moons of Jupiter *are* things which have no relation to man.
∴ E. No supposed moons of Jupiter *are* existing.

The first syllogism is Barbara and the second one is elarent, both of which are valid moods in the first figure. hus the train of reasoning is formally valid.

2. *State each of the following reasonings in its full gical form and test it fully* :—

(*a*) *The frequent blunders in assessment that are taking ace prove that valuation is not an exact science.*

Answer. Reduced to logical form, it stands thus :—

If valuation be an exact science, frequent blunders in assessment will not take place.
Frequent blunders do take place.
∴ Valuation is not an exact science.

This is a Hypothetical-Categorical Syllogism, in which by enying the consequent we deny the antecedent—which is rrect formally.

(*b*) *If virtue were knowledge, it would be capable of being ught ; but where are the teachers of virtue ?*

Answer. Reduced to logical form, it stands as follows :—

If virtue were knowledge, there would be teachers of virtue.
There are no teachers of virtue.
∴ Virtue is not knowledge.

This is a Hypothetical-Categorical syllogism in which by nying the consequent we deny the antecedent—which is rrect.

(*c*) *Movements of atoms are the only changes in the orld we know anything about. Therefore, all the changes in e world are movements of atoms.*

Answer. The expression 'the only changes in the world we ow anything about' means 'some changes in the world.' Thus e given argument expressed in logical form, would stand us :—

Movements of atoms *are* changes in the world.
∴ All changes in the world *are* movements of atoms.

This is invalid, because it involves an improper simpl conversion of an A proposition.

(*d*) *He is, to be sure, a highly educated man but all highl educated men are not qualified to be Inspectors.*

Answer. This is an Enthymeme, in which the conclusio is suppressed. The obvious conclusion implied is 'He is no qualified to be an Inspector. Reduced to logical form, i stands thus :—

Some highly educated men *are not* qualified to b Inspectors.
He *is* a highly educated man.
∴ He *is not* qualified to be an Inspector.

This argument involves the fallacy of Undistribute Middle, because the middle term 'highly educated man' is no distributed in any of the two premises.

3. *State the following arguments in syllogistic form simplifying the premises and arranging them according to Moo and Figure and show whether or not the reasoning is correct pointing out fallacies if any :—*

(*a*) *Animals cannot live without atmosphere. There i no atmosphere in the moon. Therefore, there can be no anima life in the moon.*

Answer. The argument, reduced to logical form, woul stand thus :—

E. No animals *are* beings which can live withou atmosphere.
A. The Moon *is* a place without atmosphere.
∴ E. No animals *are* beings which can live in the Moon

This illustrates the fallacy of Four Terms. 'Beings whic can live without atmosphere' and 'Place without atmosphere are different terms.

(*b*) ***The sky being cloudy, the day is sultry.***

Answer. Reduced to logical form, it may stand thus :—

A. All days with a cloudy sky *are* sultry.
A. This *is* a day with a cloudy sky.
∴ A. This day *is* sultry.

This is Barbara, a valid mood in the first figure.

(*c*) *Where there is social progress, there must be libert of individuals and where there is liberty of individuals, ther must be inequality of wealth and standing. Therefore, inequality and progress are inseparable.*

Answer. Reduced to logical form, it stands thus :—

A. All cases of social progress *are* cases of liberty individuals.

A. All cases of liberty of individuals *are* cases of inequality of wealth and standing.
∴ A. All cases of inequality of wealth and standing *are* cases of social progress.

This argument involves the fallacy of Illicit minor because the minor term 'Cases of inequality of wealth and standing' is distributed in the conclusion without being distributed in the minor premise.

(*d*) *None but material bodies gravitate; Air gravitates; therefore, it must be material.*

Answer. Reduced to logical form, it stands thus :—

A. All bodies which gravitate *are* material bodies.
A. Air *is* a body which gravitates.
∴ A. Air *is* a material body.

This is Barbara, a valid mood in the first figure.

4. *Express the following arguments in their simplest logical form, stating each in Mood and Figure and point out the fallacies in them, if any.*

(*a*) *That colouring substance cannot be blood; it is soluble in benzol.*

Answer. This is an Enthymeme. When the suppressed conclusion is supplied, the syllogism stands thus :—

E. No substance soluble in benzol *is* blood.
A. That colouring substance *is* soluble in benzol.
∴ E. That colouring substance *is not* blood.

This is Celarent, a valid mood in the first figure.

(*b*) *He has broken his word, which no honest man ever does.*

Answer. This is an Enthymeme and when the suppressed conclusion is supplied and the syllogism is reduced to its logical form, it stands thus :—

E. No honest men *are* men who break their word.
A. He *is* a man who has broken his word.
∴ E. He *is not* honest.

This is Cesare, a valid mood in the second figure.

(*c*) *All grasses have parallel-veined leaves and so has the bamboo.*

Answer. This is an Enthymeme, in which the conclusion is suppressed. When fully expressed in logical form, it stands thus :—

A. All grasses *are* things having parallel-veined leaves.
A. Bamboo *is* a thing having parallel-veined leaves.
∴ A. Bamboo *is* a grass.

This argument involves the fallacy of Undistributed Middle, because the middle term 'thing having parallel-veined leaves' has not been distributed even once in the premises.

(*d*) *That is a bee; do not touch it; it will sting you.*

Answer. Reduced to logical form, it stands thus :—

If a bee is touched, it stings.
A bee is touched.
∴ It stings.

This Hypothetical-Categorical Syllogism is correct, because, by affirming the antecedent we affirm the consequent.

(*e*) *The atmosphere after a thunderstorm must abound in Ozone, because Ozone is produced by the passage of electric sparks through the atmosphere.*

Answer. Expressed in simple logical form, it stands thus :—

Electric sparks *are* things which produce Ozone.
Thunderstorm *is* something which produces electric sparks.
∴ Thunderstorm *is* a thing which produces Ozone.

This involves the fallacy of Four Terms.

5. *State the following arguments in their full logical forms, showing Figure and Mood and examine their validity:*

(*a*) *The Kritiat cannot be a work of Plato; it is of small literary value.*

Answer. Reduced to logical form and supplying the suppressed major premise, it may be put in the following form :—

No work of Plato *is* a work of small literary value.
The Kritiat *is* a work of small literary value.
∴ The Kritiat *is not* a work of Plato.

Considered as a formal argument, this looks like Cesare, a valid mood in the second figure, but in this case in the major premise, 'the works of Plato' are really understood in a collective sense, and in this argument we really proceed from the collective to the distributive use of a term. Thus this argument involves the fallacy of Division.

(*b*) *The last speaker is opposed to the motion but every sensible man wishes it to pass.*

Answer. Fully expressed, it stands thus :—

A. All sensible men *are* men who wish the motion to pass.
E. The last speaker *is not a* man who wishes the motion to pass.
∴ E. The last speaker *is not* a sensible man.

This is formally valid being Camestres, a valid mood in the second figure; but it involves the material fallacy of *petitio principii*, because the conclusion is really assumed in the major premise.

(*c*) *I shall be admitted, because I have passed in the first division and only first division candidates will be admitted.*

Answer. Reduced to logical form, it would stand thus :—

A. All persons who will be admitted *are* first division candidates.
A. I *am* a first division candidate.
∴ A. I *am* a person who will be admitted.

The argument involves the fallacy of Undistributed Middle.

(*d*) *The more abundant a thing becomes, the more will it sink in value; and Silver is becoming more abundant every day.*

Answer. Put into logical form, it stands thus :—

If a thing becomes more and more abundant, it will more and more sink in value.
Silver becomes more and more abundant.
∴ Silver will more and more sink in value.

This Hypothetical-Categorical Syllogism is valid because, by affirming the antecedent, we affirm the consequent.

(*e*) *I shall not pass the examination, for although I should have done so, if I had read Mill's Logic, I have not read that book.*

Answer. Put into logical form, it stands thus :—

If I had read Mill's Logic, I should have passed.
I have not read Mill's Logic.
∴ I should not pass.

This Hypothetical-Categorical Syllogism is fallacious, because here we deny the consequent in the conclusion, by denying the antecedent in the minor premise—which is contrary to the rules.

6. *State the following arguments in their logical form and test them :*

(*a*) *How can any one maintain that Pain is always an evil, who admits that remorse involves pain and yet may sometimes be a real good ?*

Answer. Expressed in logical form, it stands thus :

A. All cases of remorse *are* cases of Pain.
I. Some cases of remorse *are* cases of real good.
∴ I. Some cases of real good *are* cases of Pain.

Therefore, Pain cannot always be an evil. This conclusion is correct, as the argument is Datisi, a valid mood in the third figure.

(*b*) *Where there is no law, there is no justice.*

Answer. Reduced to logical form, we may have the following Hypothetical-Categorical Syllogism :—

If there is no law, there is no justice.
There is no law.
∴ There is no justice.

By affirming the antecedent, we affirm the consequent. Hence this argument is formally valid. If however by 'law' we mean codified statute law, it may be said that the major premise is materially false.

(*c*) *You cannot define the Sun; for a definition must be clearer than the thing defined and nothing can be clearer than the source of all light.*

Answer. Reduced to logical form, the argument stands thus :—

Definition of the Sun *is* clearer than the term 'the Sun.'
Nothing *is* clearer than the Sun.
∴ Nothing is the definition of the Sun, *i.e.*, to say, the Sun cannot be defined. It is quite obvious that this involves the fallacy of Ambiguous Middle, because the term 'clearer' means different things in the two premises. Besides, "the sun" and "the term 'the Sun'" are different. Hence the argument also involves the fallacy of Four terms.

(*d*) *Gibbon was not very talented, for a successful author must be either very industrious or very talented and Gibbon was very industrious.*

Answer. This argument may be reduced to the following Disjunctive-Categorical Syllogism :—

Major Premise. A successful author must be either very industrious or very talented.
Minor Premise. Gibbon was very industrious.
Conclusion. Gibbon was not very talented.

According to Mill, if we deny one of the alternatives of a disjunctive proposition we may affirm the other alternative, but by affirming one of the alternatives we cannot deny the other alternative. Hence according to Mill's view, this argument is fallacious.

According to Ueberweg, we may affirm one alternative by denying the other as well as deny one alternative by affirming the other. But Ueberweg's view is correct only when the two alternatives are mutually exclusive like contradictory propositions. But this is not the case in the given argument because it is possible for the same man to be both very industrious and very talented. Hence in this case, Mill's view should prevail and the argument should be considered fallacious.

7. *Test the following :*

(*a*) *India comprehends Bengal; Bengal does not comprehend Bombay; India, therefore, does not comprehend Bombay.*

Answer. The fallacy of Four terms.

(*b*) *Theft cannot be a crime, for it was encouraged by the laws of Lycurgus.*

Answer. Reduced to logical form, the argument stands thus :—

E. No things encouraged by the laws of Lycurgus *are* crimes.
A. Theft *is* a thing encouraged by the laws of Lycurgus.
∴ E. No theft *is* a crime.

This is formally correct, being Celarent, a valid mood in the first figure. It may be pointed out that the major premise is assumed to be true but as a matter of fact, it is not true. This is an instance of Undue Assumption of Premises—a material fallacy.

(*c*) *None but express trains stops at this station; and as the last train did not stop, it could not have been the express train.*

Answer. Reduced to logical form, it stands thus :—

A. All trains which stop at this station *are* express trains.
E. The last train *is not* a train which stops at this station.
∴ E. The last train *is not* an express train.

This argument involves the fallacy of Illicit Major.

(*d*) *The child of Themistocles governed her mother; she governed her husband; he, Athens; and Athens, Greece; The child of Themistocles, therefore, governed Greece.*

Answer. This is an apparent train of Syllogistic reasoning in which every constitutent syllogism involves the fallacy of Four terms.

(*e*) *If all men were honest, laws would be unnecessary; but since laws are necessary, it follows that no men are honest.*

Answer. Reduced to logical form, it stands thus :—

If all men were honest, laws would be unnecessary.
Laws are necessary.
∴ No men are honest.

This is a Hypothetical-Categorical Syllogism, in which we deny the consequent in the minor premise and in the conclusion we appear to deny the antecedent of the hypothetical major. But to deny the antecedent (All men are honest) we should have drawn the conclusion 'Some men are not honest' which is the contradictory of the former. Hence the conclusion, 'No men are honest' is wrong.

(*f*) *Protective laws should be abolished; for they are injurious, if they produce scarcity and they are useless, if they do not.*

Answer. This argument is a dilemma and may be fully expressed as follows :—

If protective laws produce scarcity, they are injurious; and if they do not produce scarcity, they are useless.
Either they produce scarcity, or they do not.
∴ Either they are injurious or useless.

This is formally correct, but materially incorrect, because the second hypothetical proposition in the major premise is not true—if protective laws do not produce scarcity, they need not necessarily be useless.

8. *Test the following :*

(*a*) *The revenues of Vitellius were spent on the necessaries of life; for they were spent on meat and drink and every one must admit that meat and drink are the necessaries of life.*

Answer. Reduced to logical form, the argument stands thus :—

All amounts spent on meat and drink *are* amounts spent on the necessaries of life.
All revenues of Vitellius *are* amounts spent on meat and drink.
∴ All revenues of Vitellius *are* spent on the necessaries of life.

This argument involves the fallacy of Accident, because, the middle term 'amounts spent on meat and drink' is subject to different conditions in the two premises. In the major premise, it is true "when spent in moderation" whereas in the minor premise, it implies "when spent extravagantly."

(*b*) *Haste makes waste and waste makes want; therefore, man never loses by delay.*

Answer. This involves the fallacy of Four terms.

(*c*) *Since the virtuous alone are happy, he must be virtuous, if he is happy; and he must be happy, if he is virtuous.*

Answer. There are two Syllogisms :—

A. All happy men *are* virtuous.
A. He *is* happy.
∴ A. He *is* virtuous.

This is Barbara, a valid mood in the first figure. Again,

A. All happy men *are* virtuous.
A. He *is* virtuous.
∴ A. He *is* happy.

This is incorrect, because the middle term 'Virtuous' is undistributed in both the premises. This syllogism, therefore, involves the fallacy of undistributed middle.

(*d*) *To allow every man unbounded freedom of speech is advantageous to the state, for it is highly conducive to the interests of the community that each individual should enjoy an unlimited liberty of expressing his sentiments.*

Answer. This argument involves the fallacy of *petitio principii*, because, 'unbounded freedom of speech' and 'unlimited liberty of expressing sentiments' mean the same thing.

(*e*) *When men are pure, laws are useless; when men are corrupt, laws are broken; laws are, therefore, unnecessary.*

Answer. This is a dilemma which, reduced to logical form, stands thus :—

If men are pure, laws are useless; and if men are corrupt, laws are broken.
Either men are pure or they are corrupt.
∴ Either laws are useless or they are broken.

This is formally correct but materially false, because the alternatives in the minor premise are not exhaustive. There may be men who are pure to start with but if laws do not exist, they are apt to become corrupt.

(*f*) *What is Protestantism? It is only loyalty to the sovereign, for were not Protestants loyal to Elizabeth in her struggle with Spain?*

Answer. "What is Protestantism? It is only loyalty to the sovereign" means 'All Protestants are loyal to their sovereign.' Again, 'Were not Protestants loyal to Elizabeth?' means 'Some Protestants were loyal to one sovereign.'

Now in this argument, we conclude that 'All Protestants are loyal', from 'Some Protestants are loyal;' but the truth of the particular in Subalternation does not necessarily lead to the truth of the universal. Hence this argument involves a violation of the rules of Subalternation.

9. *Test the following arguments* :

(*a*) *If a man is educated, he does not want to work with his hands; consequently, if education is universal industry will cease.*

Answer. Reduced to logical form, this argument stands thus :—

If all men are educated, they would not want to work with their hands.
All men are educated.
∴ No men would want to work with their hands.

This argument is formally valid. The conclusion drawn here is 'Industry will cease' the implication being that when all men cease to work with their hands, Industry will cease. But all that the given argument proves is that men will not *want to work* with their hands. There is all the difference in the world between 'not wanting to work' and 'not working.' Hence the argument which surreptitiously seeks to substitute one phrase for the other is fallacious.

(*b*) *None but the wise are good and none but the good are happy; therefore, none but the wise are happy.*

Answer. Here all the three propositions of the Syllogism are Exclusive propositions. When reduced to logical form, the syllogism would stand thus :—

All good men *are* wise men.
All happy men *are* good men.
∴ All happy men *are* wise men.

This is Barbara, a valid mood in the first figure.

(*c*) *We have no right to treat heat as a substance for it may be transformed into something which is certainly not a substance namely mechanical work.*

Answer. Reduced to logical form, the argument stands thus :—

E. No things which are transformable into anything which is not a substance *are* substances.
A. Heat *is* a thing which is transformable into something which is not a substance.
∴ E. Heat *is not* a substance.

This is Calerent, a valid mood in the first figure.

(*d*) *Learned men sometimes become mad; but as he is not learned, there is no danger of his sanity.*

Answer. Reduced to logical form, it stands thus :—

I. Some learned men *are* mad.
E. He *is not* a learned man.
∴ E. He *is not* mad.

This argument involves the fallacy of Illicit Major.

(*e*) *Those who live in society are liable to go wrong morally, therefore, to be virtuous, one must renounce society.*

Answwar. This argument may be put into the following form :—

Men in society *are* liable to go wrong.
∴ Men not in society *are* liable to go right, *i.e.*, to be virtuous.

This is an example of Material Obversion. We take the contradictory of the subject as the subject and the contrary of the predicate as the predicate, the quality remains the same. This is in no way a formal argument but depends for its truth on experience.

10. *Test the following arguments* :

(*a*) *If questions do not leak out, the University is not to blame; but questions have leaked out; the University therefore, is responsible for it.*

Answer. The fallacy of denying the antecedent.

(b) How can you say he is not a careful examiner when he is severe in examining his papers as careful examiners are known to be?

Answer. Reduced to logical form, it stands thus :

All careful examiners *are* severe in examining papers.
He *is* severe in examining papers.
∴ He *is* a careful examiner.

The argument involves the fallacy of Undistributed Middle.

(c) John evidently is not honest, for only the honest are straightforward in their conduct and John is not so.

Answer. [See p. 192.]

(d) Candour as a virtue ought to be cultivated; therefore Secrecy in War should be strongly condemned.

Answer. This argument may be put into the following form :—

Candour ought to be cultivated.
∴Secrecy should be strongly condemned.

This is an illustration of what Bain calls Material Obversion in which we come to a conclusion on the basis of experience. In the given argument, over and above the fact that it is a case of material obversion, we may note that in the premise, there is no qualification, whereas, in the conclusion there is a qualification, *viz.*, "Secrecy in War." Hence, it may also be said to involve the fallacy of Accident.

11. *Test the following arguments* :

(a) It is strange that in a country like India where millions of men die every year of Plague, Malaria and other diseases, people are loath to join the army seeing that the casualties of warfare cannot be higher.

Answer. Reduced to logical form, the argument stands thus :—

If casualties of War be not higher than death due to diseases, there is no reason why people should not join the army.

The casualties of War are not higher than death due to diseases.
∴ There is no reason why people should not join the army.

This argument is formally correct but the major premise may be materially false because there may be other reasons why people do not join the army.

(b) What John Smith advocates must be a wise course, since he is a Senator and the Senate is, undoubtedly, a wise body.

Answer. Logical form:—

The Senate *is* a wise body.
John Smith *is* a Senator.
∴ John Smith *is* a wise person.

This involves the fallacy of Division because here we proceed from the collective to the distributive use of the term.

(*c*) *Shankaracharya was a great religious reformer and teacher, and as he was a bachelor, we may safely conclude that any one living a single life may become a great religious reformer and teacher.*

Answer. Logical form:—

Shankaracharya *is* a great religious reformer and teacher.
Shankaracharya *is* a bachelor.
∴ All bachelors *are* great religious reformers and teachers.

This argument involves the fallacy of Illicit Minor.

(*d*) *The whole family has been vaccinated, yet some had small pox. It is clear therefore that vaccination is no safeguard.*

Answer. Reduced to simple logical form, we may have the following Syllogism :—

A. All members of the family *are* persons who have been vaccinated.
I. Some members of the family *are* persons who had small pox.
∴ I. Some persons who had small pox *are* persons who had been vaccinated.

The conclusion drawn here is formally correct, because this syllogism is in the valid mood *Datisi*. But the conclusion drawn in the given example, *viz.*, 'Vaccination is no safeguard' may not be correct, because it may have proved a safeguard in some cases though not in all cases.

(*e*) *Improbable events happen almost every day; but what happens almost every day is a very probable event. Hence improbable events are very probable events.*

Answer. Logical form:—

Events happening almost every day *are* very probable.
Improbable events *are* events which happen almost every day.
∴ Improbable events *are* very probable.

This argument may be said to involve *the fallacy of Division*, because, the minor term "improbable events" appears to be used collectively in the premise but distributively in the conclusion. As however the minor premise does not mean that improbable events *as a whole* happen almost daily, but only that one improbable event in a total number does, so this argument involves a *Fallacy of Confusion*.

12. *Test the following :*

(a) The standard of the Calcutta University must be low, since the percentage of success at its examination is comparatively high ; and it is a well-known fact that the percentage of success is high, when the standard is low.

Answer. Logical form:—

If the standard of examination be low, the percentage of success is high.
The percentage of success is high.
∴ The standard of examination is low.

This Hypothetical-Categorical Syllogism involves the fallacy of affirming the consequent.

(b) The post-graduate classes ought to be abolished, for, if graduates have a real craving for knowledge they would continue their studies whether there be such classes or not ; and if they have no such craving, they would not continue their studies in spite of such classes.

Answer. Logical form:—

If graduates have a real craving for knowledge, post-graduate classes are unnecessary, (for graduates will continue their studies whether such classes exist or not) and if graduates have no real craving, post-graduate classes are useless (for graduates will not continue their studies though such classes exist).

Either graduates have a real craving or they have no real craving.

∴ Either post-graduate classes are unnecessary or useless.

This dilemma is formally correct but materially false, because, there is as a matter of fact no such connection between the antecedents and consequents, as is assumed in the major premise. The minor premise also is false as a matter of fact because the alternatives are not exhaustive ; it may be that in some cases, the existence of the post-graduate classes may engender a craving for knowledge.

(c) Is a man infallible? No. Then every Senator is liable to commit mistakes. Yes, ergo, the judgment of the Senate in this important matter is unreliable.

Answer. Reduced to logical form, it stands thus :—

Every Senator is liable to commit mistakes ;
∴ The Senate is liable to commit mistakes.

This involves the fallacy of Composition in which we pass from the distributive to the collective use of a term.

(d) Every man has the right of private judgment. Therefore every examiner is quite at liberty to examine answer papers as he likes.

Answer. Reduced to logical form, it stands thus :—

All men have the right of private judgment.
All examiners are men.
∴ All examiners have the right of private judgment.

This conclusion is correct but the conclusion drawn in the given argument is "every examiner is quite at liberty to examine answer papers *as he likes*." Now 'Right of private judgment' and 'Right to do what a man likes' are altogether different things and not synonymous expressions.

This argument may be said to involve the *fallacy of Accident*, because here we pass from a general rule to a special case.

(e) Only the best graduates of the University are nominated for executive service under the Government; but Jones has not been nominated, therefore he is not one of the best graduates of the University.

Answer. [See p. 192.]

13. *Test the following arguments :*

(a) Roman Catholicism is but another name for disloyalty to the sovereign, for were there not many Roman Catholic plots in England, to depose Queen Elizabeth?

Answer. Logical form :—

Some Roman Catholics were disloyal to some sovereign.
∴ All Roman Catholics are disloyal to all sovereigns.

In this case from the truth of a particular affirmative, we pass on to the truth of the corresponding universal affirmative—which is not permissible according to the rules of Subalternation. Hence the argument is fallacious.

(c) Bolshevism does not exist in India; for if it existed, its existence would have been traced by this time.

Answer. Reduced to logical form, the argument stands as follows :

If Bolshevism existed in India, its existence would have been traced by this time.
Its existence has not been traced.
∴ Bolshevism does not exist in India.

In this Hypothetical-Categorical syllogism, by denying the consequent, we deny the antecedent—which is perfectly valid.

(d) Perhaps fate was against Hannibal or how could the victor of Cannæ be vanquished at Zama?

Answer. Reduced to logical form, it stands thus :-

If the victor of Cannæ be vanquished at Zama, this is due to Fate.
The victor of Cannæ was vanquished at Zama.
∴ This is due to Fate.

The argument is formally correct, because, by affirming the antecedent, we affirm the consequent.

(e) Our University is very popular, as is evident from the increasing number of condidates at the various examination; therefore, there is no need for University reform.

Answer. This argument consists of a train of reasoning as follows :—

(1) If there is an increasing number of candidates at the various examinations, our University is popular.
There is an increasing number of candidates at the various examinations.
∴ Our University is popular.

(2) If a University be popular, there is no need for University reform.
Our University is popular.
∴ There is no need for University reform.

This argument is formally correct but the hypothetical propositions in both the syllogisms are materially false, because, there is really no such connection between the antecedents and the consequents as it assumed in the propositions.

14. *Test the following* :

(a) Swaraya or Self-Government can be attained only by doing away with servitude. As however the University in training young men renders them fit for public services, the first step towards the attainment of Swaraya must be the destruction of the University.

Answer. Logical form :

E. No cases of Swaraya *are* cases of servitude.
A. All cases of Unversity training *are* cases of fitness for public services.
∴ E. No cases of University training *are* cases of Swaraya.
i.e., The University must be destroyed, in order that Swaraya may be attained.

This argument involves the fallacy of Paronymous Terms – the terms 'Servitude' and 'Public Services' are entirely different in meaning though they are somewhat similar in origin or appearance.

(b) If all men were capable of perfection, some would have attained it ; but none having done so, none is capable of it.

Answer. Reduced to logical form, the hypothetical-categorical syllogism would stand thus :—

If all men were capable of perfection, some would haye attained perfection.
None has attained perfection.
∴ None is capable of perfection.

In this argument by denying the consequent in the minor premise we appear to deny the antecedent. But as a matter of fact the antecedent is an A proposition and to deny it, we must have an O proposition. Hence the proper conclusion should have been 'Some men are not capable of perfection.' Hence the given conclusion is false.

(c) Surely what a man has done, a man may do. Was not Hercules a man? Yes. The~~y~~n why shall we not be able to do what he did?

Answer. This argument involves the fallacy of Accident. On the strength of a general rule, which is true under certain circumstances we cannot argue from the particular case of Hercules to the particular case of our own selves.

(d) How can you deny that John is deeply versed in the subject? You see, he criticises all topics pertaining to it and evidently such critics alone can be said to have a thorough insight into the subject.

Answer. Logical form :

All persons who have a thorough insight into the subject *are* persons who criticise all topics pertaining to it.
He *is* a person who criticises all topics pertaining to the subject.
∴ He *is* a person who has a thorough insight into the subject.

This argument involves the fallacy of Undistributed Middle.

(e) If a little economy would save half our expenses, a still greater economy would certainly save all.

Answer. The argument may be reduced to the following form :—

A little economy would save half our expenses.
∴ Greater economy would save all our expenses.

This argument may be said to be a fallacious example of Inference by Added Determinants. Here the subject and the predicate have not been affected in a parallel way by the increase of quantity.

15. *Test the following* :

(a) What man has done, man may do. This man therefore must be able to cross the English Channel since Captain Webb was able to do so.

Answer. This argument involves the fallacy of Accident. From the particular case of Captain Webb it is not open to us to argue that the same would be true of this man, on the strength of a general statement, which is true within certain limits.

(b) If students did their work well, examinations would not be necessary. But we find, as a matter of fact, that examinations are necessary. It is evident therefore, that students never do their work.

Answer. Logical form :

If students do their work well, examinations are not necessary.
Examinations are necessary.
∴ No students do their work well.

In this argument by denying the consequent, we appear to deny the antecedent. But in this case the contradictory, of the antecedent is not 'No students do their work well' but the O proposition 'Some students do not do their work well.' Hence the given argument is fallacious.

(*c*) *The news is too good to be true.*

Answer. This argument may be expanded into the following Syllogism :—

No news which is too good *is* true.
This news *is* news which is too good.
∴ This news *is not* true.

This is Celarent, a valid mood in the first figure.

(*d*) *No creature is immortal and no mortal being is perfect.*

Answer. At first sight, it would appear as if both the propositions are negative but we notice that in one proposition there is the term 'immortal', in the other, 'mortal'. Let us therefore reduce one of them, say, the first proposition, to an affirmative form by Obversion.

E. No creature is immortal.
∴ Obverse A. All creatures are non-immortal, *i.e.*, mortal.

Now let us have the following two premises of a syllogism leading to a conclusion.

A. All creatures *are* mortal.
E. No mortals *are* perfect.
∴ E. No perfect beings *are* creatures (*i.e.*, created beings).

This is Camenes, a valid mood in the fourth figure.

(*e*) *Rammurti might well have been sent to quell the riot, since he is more than a match for the most powerful man.*

Answer. Reduced to logical form, it stands thus :—

Rammurti is more than a match for any person who took part in the riot.
∴ Rammurti is more than a match for all the persons who took part in the riot.

In this case, we pass from the distributive to the collective use of a term, and hence it involves the fallacy of Composition.

16. *Test the following arguments :*

(*a*) *John must be thoroughly honest, since he is very loud in denouncing evil and only those who so denounce are known to be honest.*

Answer. Logical form :

All honest persons *are* those who are loud in denouncing evil.
He *is* loud in denouncing evil.
∴ He *is* honest.

This argument involves the fallacy of Undistributed Middle.

(*b*) *Six and Seven are evidently one number, for Six and Seven are thirteen and Thirteen is one number.*

Answer. [See p. 296.]

(*c*) *Is it not a virtue to help the distressed? Certainly it is. Are not these criminals in police custody actually in distress? Yes. Then surely I ought to rescue them from this custody.*

Answer. Logical form :

All distressed persons *are* persons who should be helped.
These criminals in police custody *are* distressed persons.
∴ These criminals in police custody *are* persons who should be helped.

It is obvious that in the major premise the middle term 'distressed' is used in a general sense, whereas in the minor premise it means "distressed on account of some crime committed by them." Hence the argument involves the fallacy of Accident.

17. *Examine the following arguments and indicate fallacies, if any, which may lurk in them.*

(*a*) *A body moves, if it is propelled from behind; this body is propelled from behind, since it moves.*

Answer. This argument may be reduced to the following hypothetical-categorical form :—

If a body is propelled from behind, it moves.
This body moves.
∴ This body is propelled from behind.

This Hypothetical-Categorical syllogism involves the fallacy of affirming the consequent.

(*b*) *The killing of living creatures is sometimes necessary. Murder is killing of living creatures. Therefore, sometimes murder is necessary.*

Answer. Reduced to logical form, the argument stands thus :—

Some cases of killing of living creatures *are* necessary.
Murder *is* killing of living creatures.
∴ Murder *is* necessary.

This argument involves the fallacy of Undistributed Middle. This argument may also be taken to be an example of the fallacy of Accident.

(*c*) *Aristotle was a great logician, since he was a philosopher and all great logicians are philosophers.*

Answer. Undistributed Middle.

(*d*) *He has got fever, for his skin is hot.*

Answer. This argument may be fully expressed as follows :—

If there is fever, the skin is hot.
The skin is hot.
∴There is fever.

This argument involves the fallacy of affirming the consequent.

(*e*) *Matter does not exist since it does not think and whatever thinks exists.*

Answer. [See p. 192.]

(*f*) *Being an Indian, he must be a Hindu ; for, Indians only are Hindus.*

Answer. Undistributed Middle.

18. Examine the following arguments :

(*a*) *His losses must be cheering, for they are light and light is always cheering.*

Answer. This may be expressed in the following logical form :—

Light *is* cheering.
His losses *are* light.
∴ His losses *are* cheering.

Here 'Light' in the major premise is used in a sense, entirely different from that in which it is used in the minor premise. This is called the fallacy of Ambiguous Middle.

(*b*) *He who is most hungry eats most.*
He who eats least is most hungry.
∴ *He who eats least eats most.*

Answer. This is an instance of the fallacy of Accident. The apparent middle term 'he who is most hungry' is obviously subject to different conditions in the two premises.

(*c*) *The doctor has prescribed poison for the patient, for he has prescribed alcohol and is not alcohol a sort of poison?*

Answer. The argument may be expressed in the following logical form :—

Alcohol is a poison.
The doctor has prescribed alcohol.
∴ The doctor has prescribed poison.

This argument illustrates the fallacy of Accident, because the middle term 'poison' is subject to different conditions in the two premises.

(*d*) *Socrates was wise and wise men alone are happy. Therefore, Socrates was happy.*

Answer. Undistributed Middle.

(*e*) *All men are angels, for, they are rational beings, as all angels are.*

Answer. Undistributed Middle.

(*f*) *He is not superstitious; since all ignorant men are superstitious and he is not ignorant.*

Answer. Illicit Major.

(*g*) *You must have convicted the prisoner, for, you were a member of the committee which convicted him.*

Answer. Reduced to logical form, the argument stands thus :—

The committee convicted the prisoner.
You were a member of the committee.
∴ You convicted him.

This is an example of the fallacy of Division, because here we pass from the collective to the distributive use of the term.

19. *Examine the following arguments, pointing out the fallacy, if any, in each case.*

(*a*) *All virtuous men are happy. Therefore, he is virtuous, being happy.*

Answer. Reduced to logical form, it stands thus :—

All virtuous men *are* happy.
He *is* happy.
∴ He *is* virtuous.

This involves the fallacy of Undistributed Middle.

(*b*) *God created man; Man created sin. Therefore, God created sin.*

Answer. The fallacy of Four Terms.

(*c*) *Bats have no wings, since they are not birds and all birds have wings.*

Answer. Fallacy of Illicit Major.

(*d*) *He should apply for the post, for he is a graduate and graduates alone should apply for the post.*

Answer. Undistributed Middle.

(*e*) *If one is guilty, one trembles with fear. Therefore the accused must be guilty, for is he not trembling with fear?*

Answer. Logical form :

If one is guilty, one trembles with fear.
He trembles with fear.
∴ He is guilty.

The fallacy of affirming the consequent.

(*f*) *He must be foolish to take such a step.*

Answer. This argument may be expanded into the following form :—

A. All persons who take such a step *are* foolish.
A. He *is* a person who takes such a step.
∴ A. He *is* foolish.

This argument is correct being Barbara, a valid mood in the first figure.

It is clear that the major premise in the given argument was suppressed, and if we supply the major premise as above the argument is correct. But if we supply the following major premise the argument would be incorrect, involving the fallacy of Undistributed Middle.

A. All foolish persons *are* those who take such a step.
A. He *is* one who takes such a step.
∴ A. He *is* foolish.

20. *State the following arguments in their logical form and show whether they are correct or not, giving reasons :*

(*a*) *The General rules the army ; the General's wife rules the General ; therefore, the General's wife rules the army.*

Answer. [See p. 300.]

(*b*) *All nations which are self-governed are prosperous ; India is not self-governed, therefore India is not prosperous.*

Answer. Fallacy of Illicit Major.

(*c*) *Sisters of charity are liable to punishment, because they beg money from people and beggars are punishable according to law.*

Answer. (*See* p. 189).

(*d*) *Judging from the very large number of failures, the test must be very stiff.*

Answer. The argument may be expanded into the following logical form :—

If tests are stiff, there is a very large number of failures.
There is a very large number of failures.
∴ The test is stiff.

This argument involves the fallacy of affirming the consequent.

(*e*) *Material bodies are invisible, for they are nothing but atoms and atoms are invisible.*

Answer. All atoms *are* invisible.
All material bodies *are* atoms.
∴ All material bodies *are* invisible.

In this argument we pass from the distributive to the collective use of a term because atoms may be invisible when they are taken by themselves but when taken collectively they cannot be invisible. Hence this argument illustrates the fallacy of Composition.

21. *Reduce the following arguments to their logical form and test their validity, pointing out the fallacies if any involved in them :*

(*a*) *All these men are quite sufficient for the job ; you are one of them and therefore quite sufficient for it.*

Answer. This argument involves the fallacy of Division because here we are passing from the collective to the distributive use of a term. 'All these men' collectively may be able to do it but it does not follow that one man by himself will be able to do it.

(*b*) *You cannot undo the knot, for whatever is done cannot be undone.*

Answer. Logical form :

No things which are done *are* things which can be undone.
The knot *is* a thing done.
∴ The knot *is not* a thing which can be undone.

It is clear that this argument involves the fallacy of Ambiguous Middle, because the middle term 'a thing which is *done*' in the major premise means 'something which has been performed' while in the minor premise 'done' is equivalent to 'tied.' This argument may also be said to involve the fallacy of Ambiguous Major, because 'undone' in the major premise means something entirely different from the term used in the conclusion.

(*c*) *The Divine Law commands us to honour kings; Louis XIV is a king: therefore, the Divine Law commands us to honour Louis XIV.*

Answer. This argument involves the fallacy of Division. because we pass from the collective to the distributive use of a term.

(*d*) *If a man be perfectly happy, he is virtuous; James is virtuous; therefore he is perfectly happy.*

Answer. The fallacy of affirming the consequent.

(*e*) *The brave alone can face danger; therefore he is not brave, for he cannot face danger.*

Answer. Logical form :

A. All persons who can face danger *are* brave.
E. He *is not* a person who can face danger.
∴ E. He *is not* brave.

This argument involves the fallacy of Illicit Major.

(*f*) *If he pleads that he did not steal the goods, why, I ask, did he hide them, as no thief fails to do?*

Answer. The sentence 'No thief ever fails to hide goods' is equivalent to 'All thieves *are* persons who hide goods'; hence the argument expressed in simple logical form stands thus :—

All thieves *are* persons who hide goods.
He *is a* person who hides goods.
∴ He *is a* thief.

This argument involves the fallacy of Undistributed Middle.

22. *Reduce the following arguments to their logical form, and test their validity, pointing out fallacies, if any, involved in them* :

(*a*) *Few soldiers can be considered heroes; for any one who is incapable of fear must be called a hero, but few soldiers can be said to be incapable of fear.*

Answer. The argument when reduced to logical form would stand as follows :—

A. All persons incapable of fear *are* persons who can be considered as heroes.
O. Some soldiers *are not* persons who are incapable of fear.
∴ O. Some soldiers *are not* persons who can be considered as heroes.

This argument involves the fallacy of Illicit Major.

(*b*) *James is truly noble, for he is virtuous and only the virtuous are truly noble.*

Answer. The fallacy of Undistributed Middle.

(*c*) *The Moon goes round the Earth; the Earth goes round the Sun; therefore the Moon goes round the Sun.*

Answer. Fallacy of Four Terms.

(*d*) *Women as a class have not been hitherto equal in intellect to men; therefore they are necessarily inferior.*

Answer. In this argument, we pass from an Assertory proposition to its corresponding Necessary form but according to the rules of Modal Consequence, the truth of an Assertory proposition does not justify the inference of the truth of a necessary proposition. Hence, this argument is fallacious.

(*e*) *Mathematical study undoubtedly improves the reasoning powers; but as the study of Logic is not mathematical study, we may infer that it does not improve the reasoning powers.*

Answer. Reduced to logical form, the argument stands thus :—

Mathematical study *is* something which improves the reasoning powers.
No study of Logic *is* mathematical study.
∴ No study of Logic *is* something which improves the reasoning powers.

This argument involves the fallacy of Illicit Major.

(*f*) *He that is of God heareth my words; ye therefore hear them not, because ye are not of God.*

Answer. Reduced to logical form, the argument stands thus :—

All who are of God *are* persons who hear my words.
You *are not* of God.
∴ You *are not* of those who hear my words.

This argument involves the fallacy of Illicit Major.

(*g*) *To play all day is a proof of great idleness; so this violinist must be a very idle person.*

Answer. Reduced to logical form, the argument stands thus :—

All persons who play all day *are* very idle persons.
This violinist *is* a person who plays all day.
∴ This violinist *is* a very idle person.

In this argument the middle term 'person who plays all day,' is subject to different conditions in the two premises. In the case of the violinist, 'playing on the violin' is his business and not mere play as understood by the term used in the major premise. This fallacy is called the fallacy of Accident.

(*h*) *Prosperity is a reward of virtue; and honour, that of honesty. But James is either prosperous or is honest. Therefore, either James is industrious or he is honest.*

Answer. This question was set in a University examination but the printer's devil is responsible for endless confusion in this case, and the whole thing is unmeaning. Some sense may be evolved, if instead of the proposition, 'James is either prosperous or is honest,' we take the proposition, 'Either James is virtuous or is honest,' and instead of the proposition, 'Either James is industrious or he is honest,' we take the proposition, 'Either James is prosperous or he is honoured'. In that case the argument may be reduced to the following dilemma :—

If James is virtuous, he is prosperous; and if James be honest, he is honoured.
Either James is prosperous or is honest.
∴ Either James is prosperous or is honoured.

This argument is correct, because, here in the minor premise, we have affirmed the antecedent of the compound hypothetical major premise and in the conclusion, we have affirmed the consequents. One characteristic of a dilemma however is absent in this case because the conclusion is not a disagreeable one.

23. *Reduce the following arguments to their logical form,*

and test their validity, pointing out the fallacies, if any, involved in them :—

(*a*) *Everything is allowed by law which is morally right; indulgence in pleasures is allowed by law; therefore, indulgence in pleasures is morally right.*

Answer. Reduced to logical form, the argument stands thus :—

All things which are morally right *are* allowed by law.
Indulgence in pleasures *is* allowed by law.
∴ Indulgence in pleasures *is* morally right.

The argument involves the fallacy of Undistributed Middle.

(*b*) *None but the honest can be trusted; therefore, James is not honest, for he cannot be trusted.*

Answer. Reduced to logical form, the argument stands thus :—

A. All persons who can be trusted *are* honest.
E. James *is not* a person who can be trusted.
∴ E. James *is not* honest.

The argument involves the fallacy of Illicit Major.

(*c*) *If he says that he did not tell a lie, why I ask, did he look abashed, as liars always do?*

Answers. Reduced to logical form, the argument stands thus :—

All liars *are* persons who look abashed .
He *is* a person who looked abashed.
∴ He *is* a liar.

This involves the fallacy of Undistributed Middle.

(*d*) *If all the accused were innocent, they would have been acquitted; we may infer that none were innocent, since none have been acquitted.*

Answer. Reduced to logical form, this is equivalent to the following Hypothetical-Categorical Syllogism :—

If all the accused were innocent, they would have been acquitted.
They have not been acquitted.
∴ They were not innocent.

In this case, by denying the consequent in the minor premise, we have denied the antecedent in the conclusion. Hence, the argument is correct.

(*e*) *Every hen comes out of an egg; every egg comes out of a hen; therefore, every egg comes out of an egg.*

Answer. The fallacy of Four terms.

24. *Analyse and test the following arguments, and mention the fallacy* (*if any*) *which they involve :—*

(*a*) *It hoots; so it is only an owl.*

Answer. This is an enthymeme, and when expanded into its fully developed form it stands thus :—

All owls *are* animals which hoot.
It *is* an animal which hoots.
∴ It *is* an owl.

This involves the fallacy of Undistributed Middle.

(*b*) *All men are not industrious; but Brown is industrious; so he cannot be a man.*

Answer. The fallacy of Illicit Major.

(*c*) *Some mineral compounds are not decomposed by heat; therefore, no organic substances are mineral products, since all organic substances are decomposed by heat.*

Answer. Reduced to logical form, the argument stands thus :—

O. Some mineral substances *are not* decomposed by heat.
A. All organic substances *are* decomposed by heat.
∴ E. No organic substances *are* mineral products.

This involves the fallacy of Illicit Major.

(*d*) *If this patent medicine is of any value, those who take it will improve in health. Therefore it is of value, since my friend who has been taking it has improved in health.*

Answer. Reduced to logical form, the argument stands thus :—

If this patent medicine is of any value, one who takes it improves in health.
My friend who takes it has improved in health.
∴ This patent medicine is of value.

This argument involves the fallacy of affirming the consequent.

(*e*) *The end of life is its perfection; death is the end of life; therefore, death is the perfection of life.*

Answer. [See p. 301.]

(*f*) *He must be an Englishman, for all Englishmen hold such views.*

Answer. This enthymeme may be expanded into the following syllogism :—

All Englishmen *are* persons who hold such views.
He *is* a person who holds such views.
∴ He *is* an Englishman.

This involves the fallacy of Undistributed Middle.

25. *Put the following arguments in logical form, and test their validity mentioning the fallacies (if any) involved in them :—*

(*a*) *Air is material, for it gravitates like all material things.*

Answer. [See p. 191.]

(*b*) *If you work hard, you will get a prize. Therefore you must have worked hard, for you have got a prize.*

Answer. This is a Hypothetical-Categorical Syllogism and expressed in logical form, stands thus :—

If you work hard, you get a prize.
You get a prize.
∴ You have worked hard.

The argument involves *the fallacy of affirming the consequent.*

(*c*) *Some poisons are vegetable; no poisons are useful drugs ; therefore some useful drugs are not vegetable.*

Answer. The fallacy of Illicit Major.

(*d*) *The soul always thinks, inasmuch as to think is its nature as a rational being.*

Answer. This argument may be logically expressed in the form of the following syllogism:—

All rational beings *are* thinking.
The soul *is* a rational being.
∴ The soul *is* thinking.

This syllogism, being the valid mood, *Barbara*, in the first figure, is correct. It may be pointed out however that this argument involves the fallacy of *petitio principii*, because we take for granted the very thing we pretend to prove. If thinking is the very nature of the soul, it will certainly always think.

(*e*) *I can afford to buy these books. I can afford to buy these pictures. I can afford to buy these statuettes. The books, the pictures, and the statutettes are all that I at present wish to buy. I can therefore buy everything that I want to buy.*

Answer. This argument involves *the fallacy of Composition*, because we proceed from the distributive to the collective use of the term, "the books, the pictures and the statutettes." I can afford to buy them separately but it does not follow that I can afford to buy all of them together.

(*f*) *I knew he was a Bohemian, for he was a good musician, and Bohemians are always good musicians.*

Answer. The fallacy of Undistributed Middle.

(*g*) *All men have equal rights ; therefore if A has a right to ten thousand a year so has B.*

Answer. This argument involves *the fallacy of Accident*, because we argue that what is true as a general rule is true in a special case.

26. *State the following arguments in their strictly logical*

forms and test their validity, mentioning the fallacies (if any) involved in them :—

(*a*) *He must be a Scotsman, for no Scotsman can see the force of a joke.*

Answer. [See p. 193.]

(*b*) *I do not derive my opinion from the newspapers; for I never read any of them.*

Answer. This is an enthymeme. Supplying the suppressed major premise and reducing the syllogism to its logical form, the argument stands thus :

All persons who read newspapers *are* persons who derive their opinion from them.
I *am not* a person who reads newspapers.
∴ I *am not* a person who derives opinion from them.

This argument involves the *fallacy of Illicit Major.*

(*c*) *We know the policy was wrong; for, otherwise, it would not have failed.*

Answer. This is an enthymeme. Supplying the suppressed major premise and reducing the syllogism to its logical form, the argument stands thus :

All cases of wrong policy *are* cases of failure.
This *is* a case of failure.
∴ This *is* a case of wrong policy.

This argument involves the *fallacy of Undistributed Middle.*

(*d*) *If the charge is false, the author of it is either ignorant or malicious; but the charge is true; therefore he is neither ignorant nor malicious.*

Answer. Reduced to logical form, the argument stands thus :

If the charge is false, the author is either ignorant or malicious.
The charge is not false (true).
∴ The author is neither ignorant nor malicious.

This hypothetical-categorical syllogism involves *the fallacy of denying the antecedent.*

(*e*) *Warm countries alone produce wine; Spain is a warm country; therefore Spain produces wine.*

Answer. Reduced to logical form, the argument stands thus :

A. All countries which produce wine *are* warm countries.
A. Spain *is* a warm country.
∴ A. Spain *is* a country which produces wine.

This syllogism involves *the fallacy of Undistributed Middle.*

(*f*) *Lawyers cannot afford to be sincere, and no one who is insincere is trustworthy. Therefore no trustworthy people will be found to be lawyers.*

Answer. Reduced to logical form, the argument stands thus :

A. All lawyers are insincere.
E. No insincere men *are* trustworthy.
∴ E. No trustworthy persons *are* lawyers.

This argument is in the mood, Camenes, a valid mood in the fourth figure and hence the argument is formally correct.

(g) *Mercy but murders, pardoning those that kill.*

Answer. This may be treated as an Enthymeme and when expanded may stand as follows :—

A. All cases of pardoning murderers *are* cases of murder.
A. All cases of pardoning murderers *are* cases of mercy.
∴ A. All cases of mercy *are* cases of murder.

This argument involves *the fallacy of Illicit Minor.*

27. *State the following arguments in their strictly logical forms, and test their validity mentioning the fallacies, if any, involved therein :—*

(*a*) *Seeing is believing ; hence I refuse to believe in God.*

Answer. Reduced to logical form and supplying the suppressed minor premise of the given enthymeme, the syllogism stands thus :—

A. All cases of seeing *are* cases of believing.
E. God *is not* a case of seeing.
∴ E. God *is not* a case of believing.

This argument involves the fallacy of Illicit Major, because the major term 'case of believing' has been distributed in the conclusion without being distributed in the major premise.

(*b*) *The proposition is too good to be practicable.*

Answer. This enthymeme may be expanded into the following syllogism :—

E. Nothing that is too good *is* practicable.
A. The proposition *is* too good.
∴ E. The proposition *is not* practicable.

Formally speaking, this argument being in the mood *Celarent* is correct, but it involves the material fallacy of *Begging the question* because, to say that something is *too* good is to assume that it is not practicable.

(*c*) *All novelty is injury, for it defaces the present state of things.*

Answer. This enthymeme may be expanded into the following syllogism by supplying the suppressed major premise :

A. All that defaces the present state of things *is* injury.
A. All novelty *is* that which defaces the present state of things.
∴ A. All novelty *is* injury.

This argument involves the fallacy of *Ambiguous middle*, because 'defaces' in the major premise means 'disfigures' while in the minor premise, it simply means 'changes.'

(*d*) *He need not fear madness, for he has no learning, and learning makes a man mad.*

Answer. Reduced to logical form, the argument stands thus :

A. All cases of learning *are* cases of making a man mad.
E. His case *is not* a case of learning.
∴ E. His case *is not* a case of making a man mad.

This syllogism involves the fallacy of Illicit Major, because the major term 'a case of making a man mad' has been distributed in the conclusion without being distributed in the major premise.

(*e*) *Compulsory attendance at college lectures is absurd. For, if lectures are valuable, the boys will attend them without any compulsion ; if they are not valuable, they need not be attended.*

Answer. This is a Dilemma which may be reduced to the following logical form :—

Major Premise—If lectures are valuable, boys will attend them without any compulsion ; and if lectures are not valuable, they need not be attended.

Minor Premise—Lectures are either valuable or not.
∴ Conclusion—Either boys will attend them without compulsion or they need not be attended.

Hence, it is inferred that compulsory attendance at college lectures is absurd. Formally speaking, the Dilemma is correct but dilemmatic arguments are often materially fallacious and in this case we find that the consequent of the first hypothetical proposition in the major premise does not, as a matter of fact, follow from the antecedent. It is not true as a matter of fact that in all cases if lectures are valuable boys will attend them without any compulsion. Young boys are often oblivious of their own interests and hence, some amount of compulsion may do them good. In this case the Dilemma is materially false because the major premise is materially false. This form of proving the incorrectness of a Dilemma is called "*Taking the dilemma by the horns.*"

(*f*) *None but the truthful are honest, none but truthful men are worthy of respect ; therefore, all men who are worthy of respect are honest.*

Answer. [See p. 301.]

(*g*) *If men have free will, they are responsible for their actions ; but men have no free will ; therefore, they are not responsible for their actions.*

Answer. This Hypothetical-Categorical syllogism may be reduced to the following logical form :—

If men have free will, they are responsible for their actions.
Men have no free will.
∴ Men are not responsible for their actions.

This Hypothetical-Categorical syllogism involves the fallacy of *denying the antecedent*, because, here in the minor premise we have denied the antecedent and on the strength of that, denied the consequent in the conclusion.

28. *State the following arguments in their strictly logical forms, and test their validity, mentioning the fallacies, if any, involved therein* :—

(*a*) *Only un-ambiguous language is scientific ; the language of Logic is un-ambiguous ; therefore, it must be scientific.*

Answer. The fallacy of Undistributed Middle.

(*b*) *Idiots cannot be men, for men are rational.*

Answer. This is an enthymeme which may be expanded into the following syllogism :—

A. All men *are* rational.
E. No idiots *are* rational.
∴ E. No idiots *are* men.

This argument involves the fallacy of *Ambiguous Middle*, because the apparent middle term 'rational' means in the major premise 'endowed with reason' while in the minor premise, it means 'intelligent' or 'sane.'

(*c*) *Only material bodies gravitate, and light does not gravitate.*

Answer. [See p. 301.]

(*d*) *Men are sinners, saints are men ; therefore, saints are sinners.*

Answer. The proposition 'Men are sinners' is an Indefinite proposition and is equivalent to 'Some men are sinners.' Hence, reduced to logical form, the syllogism stands thus :—

I. Some men *are* sinners.
A. All saints *are* men.
∴ A. All saints *are* sinners.

The syllogism involves the fallacy of Undistributed Middle, because the middle term 'men' has not been distributed even once in the premises.

(*e*) *No young man is wise ; for only experience can give wisdom, and experience comes only with age.*

Answer. The proposition 'Only experience can give wisdom' is equivalent to 'All that can give wisdom' *is* 'experience.' The proposition 'experience comes only with age' means 'Only age can give experience' and is, therefore, equivalent to 'All that gives experience is age.' The premises, therefore, may be arranged as follows :—

A. All that can give wisdom *is* experience.
A. All that gives experience *is* age.

We find that here, instead of three terms, there are four terms, *viz.*, (1) that which can give wisdom, (2) experience, (3) that which gives experience, (4) age. Hence, the argument involves *the fallacy of four terms* and no conclusion can be drawn.

(*f*) *None but the contented are happy, none but the virtuous are contented, none but the wise are virtuous ; therefore, none but the wise are happy.*

Answer. This argument consists of two syllogisms connected with each other so as to form a train of syllogistic reasoning and if the constituent propositions be reduced to logical form, the series stands as follows :—

All happy men *are* contented.
All contented men *are* virtuous.
All virtuous men *are wise.*
∴ All happy men *are* wise.

Now let us attempt to split up the above series into its constituent syllogisms :—

(1) All contented men *are* virtuous.
All happy men *are* contented.
∴ All happy men *are* virtuous.

Taking this suppressed conclusion as the minor premise, let us have the other syllogism in the series :—

(2) All virtuous men *are* wise.
All happy men *are* virtuous.
∴ All happy men *are* wise.

This is a valid Aristotelian Sorites.

(*g*) *Moral exhortations are useless ; for good men do not need them, and bad men will pay no heed to them.*

Answer. This argument may be expanded into the following dilemma :—

Major Premise If men are good, they do not need moral exhortations ; and
If men are bad, they will not pay any heed to moral exhortations.
Minor Premise—Men are either good or bad.
Conclusion ∴ Either man do not need moral exhortations or they do not pay any heed to them.

In other words, *Moral exhortations are useless.*

This Dilemma is materially fallacious, because both the major premise and the minor premise are materially false. So far as the major premise is concerned, there is no reason to suppose that good men do not require any moral exhortations or that bad men will not, under any circumstances, pay heed to moral exhortations. It is quite possible that good men sometimes, particularly in times of difficulty, may require such exhortations and bad men also may sometimes be induced to listen to them. Hence, both the hypothetical propositions in the major premise are materially false. Again, the minor premise states that men are either good or bad whereas, as a matter of fact the vast majority of men are neither absolutely good nor absolutely bad but merely indifferent and as such open to various kinds of external influences. In such cases, moral exhortations are likely to be highly useful. Thus we can prove the falsity of this Dilemma either by "taking the dilemma by the horns' *i.e.*, by showing that the major premise is false or by 'escaping between the horns,' *i.e.*, by showing the minor premise to be false.

Exercise XVII.

1. *Examine the validity of the following arguments and statements, explaining and specifying fallacies if any* :—

(*a*) The theory of evolution is true because it is accepted by every scientific biologist.

(*b*) The laws of Nature can never be broken. Social law is a part of the general system of nature ; therefore it cannot be broken.

(*c*) The holder of some shares in a lottery is sure to gain a prize, and as I am the holder of some shares in a lottery, I am sure to gain a prize.

(*d*) I will have no more doctors ; I see that all of those who died this winter have had doctors.

(*e*) "Corps requires the services of an officer who can speak Italian fluently for four or five days." (Advertisement in *Punch*).

(*f*) "There may be some one among you who will be vexed when he remembers how he prayed and entreated the judges to acquit him with many tears and brought forward his children and many friends and relatives in court to appeal to your feelings, and then finds that I shall do none of these things." (What kind of argument does Socrates refuse to employ in his defence before his Athenian judges?)

(*g*) He was too impulsive a man not to have committed many errors.

(*h*) It is injustice to the intellect of women to refuse them the suffrage ; for the reigns of many queens have been famous for literary productions.

(*i*) Dictor's advice : The late Mr. Smith was removed to the hospital where he died on Wednesday last on the advice of his doctor.

2. *Examine the following arguments, pointing out and naming the fallacies, if any* :—

(*a*) If their theories were sound, philosophers would agree among themselves.

(*b*) Good men write good books ; this is a good book and therefore its author must be a good man.

(*c*) No man wishes to suffer pain ; your friend cannot be cured without suffering pain, and therefore will not wish to be cured.

(*d*) The explosion was obviously due to gunpowder, as nothing else possesses sufficient force.

(*e*) In giving advice, you either advise a man to do what he already intends to do, in which case your advice is superfluous, or you advise him to do what he is resolved not to do, in which case the advice is ignored.

(*f*) Not all educated persons spell correctly, for spelling mistakes frequently occur in the papers of Intermediate candidates.

3. *Examine the following arguments, explaining the nature of the fallacy, if any* :—

(*a*) If language is the communication of information by signs, we must admit that the wagging of a dog's tail is language.

(*b*) Had there been satisfactory proof of the prisoner's guilt, it would have been produced. No such evidence has been brought forward, so he must be innocent.

(*c*) A little knowledge is a dangerous thing ; hence I had better not attempt to learn Logic.

(*d*) All civilised people are progressive ; all uncivilised people are superstitious ; therefore no superstitious people are progressive.

(*e*) Food which is not cooked is not wholesome. This food is not cooked, and is therefore not wholesome.

(*f*) Of University Professors some are keen on research, and some are good teachers. Professor X is keen on research, and we may therefore reasonably conclude that he is not a good teacher.

4. *Examine the following arguments* :—

(*a*) The Intermediate Board has taken over the control of the Intermediate Examination. This shows that the University of Allahabad was not conducting the Examination properly.

(*b*) A man of genius is generally eccentric ; you are eccentric ; therefore, you are a man of genius.

(*c*) A man who is inoculated becomes immune from plague ; I am not inoculated ; therefore, I am not immune from plague.

(*d*) If James is fated to die, no doctors can save him ; if he is fated to recover, no doctors are needed ; why then waste money on doctors ?

(*e*) Our critics tell us that we are supporting uneducated candidates for the Municipal Board election. Every one of the men in question is managing his business of lakhs of rupees. Why cannot they manage Municipal affairs ?

(*f*) Under particular circumstances political revolutions are necessary for the welfare of a country ; in China, political revolutions are frequent ; therefore China is making rapid progress.

(*g*) My brother and my cousin passed the examination in the first division ; therefore I have every chance of passing the examination in the first division.

5. *Examine the following arguments* :—

(*a*) To show that something is visible, it is enough to point out that some one can see it. Similarly we can prove that pleasure is desirable by showing that it can be desired.

(*b*) If the conclusion is validly drawn from two premises, it must be true. In the present case, the premises and the conclusion are all true propositions. The syllogism, therefore, is quite valid.

(*c*) So many people can reason quite well without studying Logic, and so many reason quite indifferently inspite of having studied Logic. Why then worry about the study of the subject ?

6. *Examine the following arguments, carefully analysing each and pointing the fallacies, if any, and giving reasons for your answer* :—

(*a*) All who speak in favour of wickedness are themselves wicked.

(*b*) If I study Logic for a month just before the examination I shall be sure to pass in it ; I am naturally good in English so I need not study my text books from the beginning of the year. I have a good memory and can revise my history course three weeks before the examination. I am quite sure, therefore, that I need not study at all till a month before the examination, in order to pass.

(*c*) If India is to make any progress we must spend lakhs in founding new schools and in promoting education.

A very large sum of money is needed for improvements in Agriculture. A big army and a navy have to be maintained and this costs huge sums of money. Irrigation and Railways, Industry and Manufacture also cannot be neglected. India would be bankrupt if all these things were done ; therefore we cannot afford to spend any money on Education or Agriculture.

(*d*) Jones is indebted to James and James is indebted to me. Obviously, therefore, Jones is indebted to me.

7. *Examine the following arguments carefully analysing each and pointing out fallacies, if any, giving reasons for your answer in every case. Merely mentioning the technical name of the fallacy is not enough* :—

(*a*) A showman advertised that children of both sexes would be admitted to see the show free of any charge, but when they all came in, he charged both boys and girls and argued that he was justified in making them pay as neither boys nor girls were of both sexes.

(*b*) There are many lawyers who can reason very well and can often win their case by argument though they have never studied Logic ; it is therefore quite unnecessary for one to study Logic.

(*c*) The general object which all laws have in common is to increase the total happiness of the community, and in order to do that they must exclude everything that causes unhappiness ; but all the laws punish, and punishment causes unhappiness ; therefore, all laws decrease the happiness of the community.

(*d*) To give advice to people is futile. If you advise them to do what they already intend to do, advice is not needed ; if you advise them to do, what they have no mind to do, advice is ineffective.

8. *Examine the following arguments, carefully analysing each and pointing out fallacies, if any. Merely mentioning the technical name of the fallacy will receive no credit* :—

(*a*) Only first division students are awarded stipends by the Principal. I have passed in the first division. Therefore, I shall get a stipend.

(*b*) If the population grows, wages tend to be lowered. In the United Provinces, the wages are low. Therefore, in the United Provinces the population has grown.

(*c*) All business that is ill-managed is unprofitable. All Railways are well-managed. Therefore, all Railways are profitable.

(*d*) If O is true, A is false, I is false, and therefore E is true. Thus the truth of O involves the truth of E.

(*e*) Five out of the seven Directors of the Company are political leaders of the country. What better proof is needed to show that it is a sound concern?

(*f*) Men are not brutes; brutes are irrational; all irrational beings are irresponsible, therefore men are not irresponsible.

9. *Examine the following arguments, carefully analysing each and pointing out fallacies, if any. Merely mentioning the technical name of the fallacy will receive no credit* :—

(*a*) A man of perfect character cannot help doing what is right. But what is done from necessity is not done from choice, and what is not done from choice has no merit. A man of perfect character, therefore, does nothing that is meritorious.

(*b*) If there were no criminals, there would be no police. But police is necessary in a civilised society. Therefore, criminals are necessary in a civilised society.

(*c*) Every incident in this story is very natural and probable; therefore, the story itself is natural and probable.

(*d*) It is the business of the State to enforce rights. Giving charity to the poor is right; and therefore, should be enforced by the State.

(*e*) All Professors are graduates. No Professors are members of the Municipal Board. The Municipal Board is, therefore an unintellectual body.

(*f*) Examinations are no test of the ability of candidates. Some weak students get through the examinations. I admit, sir that I am very weak; but, please, let me have a chance; I am sure I shall pass.

10. *Examine the following arguments, carefully analysing each and pointing out fallacies, if any. Merely mentioning the technical name of the fallacy will receive no credit* :—

(*a*) Good workmen do not complain of their tools; my pupils do not complain of their tools; therefore my pupils are good workmen.

(*b*) All thieves are dishonest; all dishonest persons are immoral; some immoral persons are not punished; therefore, some thieves are not punished.

(*c*) All intelligible propositions are either true or false. The two propositions 'the College will be closed to-morrow' and 'the College will not be closed to-morrow' are both intelligible propositions. Therefore they are both true, or both false.

(*d*) John is my friend and James is a friend of John. Obviously, James is my friend.

(*e*) Why should we fret about happenings that are not to our taste? If we can help them, we should manfully fight against them; if we cannot help them, we should cheerfully endure them.

(*f*) What can be affirmed of a whole can certainly be affirmed of a part included in the whole. The entire population of India is about 33 crores. Therefore, the population of the United Provinces, which is a part of the Indian population, is about 33 crores.

(*g*) Brutus. Who is here so vile that will not love his country? If any, speak, for him have I offended. I pause for a reply.
Citizens. None, Brutus, none.
Brutus. Then none have I offended.

11. *Examine the following arguments, carefully analysing each and pointing out fallacies, if any. Merely mentioning the technical name of the fallacy will receive no credit.*

(*a*) Bullies are always cowards, but not always liars. Liars, therefore, are not always cowards.

(*b*) In the Happy Valley gardens at Mussoorie, the Municipal board has put up a notice—'Don't pluck fruits.' I don't see why the gardener prevented me from plucking flowers; the Municipal Board certainly had no objection to it.

(*c*) What every man desires is unquestionably desirable; everyone desires his own happiness; therefore, happiness of the individual is desirable.

(*d*) In a valid syllogism, if the premises are true, the conclusion must be true. It is obvious that, in such a syllogism if either premise or both the premises are false, the conclusion must be false.

(*e*) If the train is late, I cannot reach Allahabad in time for the meeting of the Intermediate Board; if it is not late, I cannot catch the train, but the train will be either late or not late, therefore, in any case, I cannot attend the meeting of the Board.

12. *Put the following arguments into logical form, examine their validity and mention the fallacy, if any, that you may detect* :—

(*a*) One can live without food; for one can live without bread or rice or potatoes or any other kind of food.

(*b*) You say that this book is inaccurate, but I saw an excellent review of it in the newspapers.

(*c*) In reply to the speaker's argument it need only be said that only a few years ago he himself used to advocate the view which he now seeks to deprecate.

(*d*) It is too cold for this plant to grow.

13. *Reduce to syllogistic form and examine the following arguments, naming the fallacy which you may discover :—*

(*a*) It is useless to give advice ; for if a man is wise he will not require it, and if he is not wise he will go his own way.

(*b*) M is the only possible cause of X ; if, therefore, we find X occurring, we may be sure of the presence of M.

(*c*) Some statesmen are also authors ; for such are Beaconsfield, Gladstone, Macaulay and others.

(*d*) Only if an officer is cool-headed does he deserve the chief command, and as this officer has not been thought worthy of the appointment, we may conclude that he is not cool-headed.

(*e*) The regiment behaved bravely in action ; therefore, it must be composed of brave men.

(*f*) He is certainly guilty, for he behaved as a guilty man would behave.

14. *Examine the following arguments, and point out any fallacy that may lurk in them :—*

(*a*) A mouse is an animal, therefore, a large mouse is a large animal.

(*b*) Only some men are liars, therefore, there are some liars who are not men.

(*c*) The truly brave are never bullies ; hence all bullies are cowards.

(*d*) A condemns Napoleon and Cæsar. But Napoleon and Cæsar are great men. Therefore, A condemns great men.

(*e*) The governor of a country ought not to be blamed for using his influence to further his religious views, for every man has a right to inclucate his own opinion.

15. *Test the following arguments, and note any fallacies they commit :—*

(*a*) This syllogism must be valid, for, like all valid syllogisms, it has three terms.

(*b*) Fallacies are only excusable if they are unavoidable ; but they are avoidable, therefore, they are inexcusable.

(*c*) There is no harm in allowing boys to climb trees. If they are confident, they are perfectly safe ; if they are nervous, they will not climb high enough to run a risk.

(*d*) A man should be allowed to do what he likes with his own ; therefore, the law should not interfere with the conditions under which he employs labour.

(*e*) Food is a necessity of life ; venison is food ; therefore, venison is a necessity of life.

(*f*) The human soul must be diffused over the whole body, for it animates every part of it.

16. *Examine the following arguments and point out which are valid syllogisms naming the figure and mood and giving the technical name of the fallacy :—*

(*a*) Some vertebrates are bipeds ;
Some bipeds are birds ;
∴ Some birds are vertebrates.

(*b*) All vices are reprehensible ;
Emulation is not reprehensible ;
∴ Emulation is not a vice.

(*c*) Aryans are destined to possess the world ;
Chinese are not Aryans ;
∴ Chinese are not destined to possess the world.

(*d*) No fool is fit for high positions ; all here present are not fools ; therefore, all here present are fit for high positions.

(*e*) Governments are good which promote prosperity, the government of Russia does not promote prosperity, therefore, it is not a good government.

(*f*) All cruel men are cowards, no college men are cruel, therefore, no college men are cowards.

(*g*) No dishonest man is fit for a high position, the students of Inter-Arts are known to be honest, therefore, those students are fit for a high position.

(*h*) Some useful metals are becoming rarer. Iron is a useful metal, and is, therefore, becoming rarer.

(*i*) Many unemployed people are not unskilful, all my friends are unemployed, therefore, none of them are unskilful.

17. *Supply the suppressed propositions in the following enthymemes and examine their validity naming the fallacies, if any :—*

(*a*) This iron is not malleable ; for it is cast iron.

(*b*) Being born in Africa, he was naturally black.

(*c*) The King is at Windsor, for the royal standard is flying.

(*d*) Calcutta is an industrial city, and industrial cities are health-resorts.

(*e*) You are not an engineer ; therefore, you are not eligible for this post.

(*f*) All these people must be good citizens ; for only good citizens obey the law.

18. *Examine the formal validity of the following hypothetical-categorical syllogisms :—*

(*a*) Had all the students been prepared for the test, some would have succeeded; but none have come out successful.

(*b*) If any one can square the circle, he is a great mathematician, but no one can.

(*c*) We know that the policy was wrong; for otherwise it would not have failed.

(*d*) If there were no dew the weather would be foul; but there is dew; therefore, the weather will be fine.

(*e*) I shall see you if you do not go; but as you are going I shall not.

(*f*) If there are sharpers in the company we ought not to gamble; but there are no sharpers in the company; therefore, we ought to gamble.

(*g*) If a country be prosperous the people will be loyal. The people of this country are loyal and, therefore, it must be prosperous.

(*h*) If man were not capable of progress, he would not differ from the brutes; but man does differ from the brutes, therefore, he is capable of progress.

(*i*) If he had studied his lesson, he would have been able to recite; but he was able to recite, and, therefore, must have studied his lesson.

19. *Test the validity of the following disjunctive-categorical syllogisms* :—

(*a*) He did not take Greek in his Degree course; for all candidates must take either Latin or Greek, and he took Latin.

(*b*) A successful man must be either industrious or rich; but this successful man is industrious; therefore, he must be rich.

20. *Reduce the following to logical form, and say if they contain any fallacy* :—

(*a*) All thieves are dishonest; all dishonest men are immoral; some immoral men are not punished. Therefore, some thieves are not punished.

(*b*) A classical education is worthless, for we make no use of the ancient languages in later life.

(*c*) Great men have been derided, and I am derided; which proves that my theory ought to be adopted.

(*d*) He must be a Democrat; for all Democrats believe in Free Trade.

(*e*) The receiver of stolen property should be punished; you have received stolen property, and therefore, should be punished.

(*f*) There should be no restriction of debate in the Assembly, because freedom of speech is one of the most cherished privileges.

(*g*) All trained logicians can detect fallacies; but few voters are trained logicians, so that few voters can detect fallacies.

21. *Draw conclusions from the following pairs of premises specifying the mood and the figure employed:—*

(*a*) Sodium is a metal;
Sodium is not a very dense substance.

(*b*) All lions are carnivorous animals;
No carnivorous animals are devoid of claws.

(*c*) Combustion is chemical action;
Combustion is always accompanied by heat.

(*d*) All students of this class are intelligent;
There are no students in this class under twenty.

(*e*) None but gentlemen are members of the club;
Some members of the club are not officers.

(*f*) All officers are invited to dine;
All members of the club are invited to dine.

22. *What are the suppressed premises which are evidently presumed to exist in the following incompletely stated syllogisms?*

(*a*) The science of Logic is very useful; it enables us to detect our adversaries' fallacies.

(*b*) He must be in Calcutta, for he is not in Bombay.

(*c*) Blessed are the meek: for they shall inherit the earth.

(*d*) Suffer little children to come unto me; for of them is the kingdom of heaven.

(*e*) Some parallelograms are not regular plane figures for they cannot be inscribed in a circle.

23. *Supply premises to prove or disprove the following conclusions:—*

(*a*) Private property should be respected in war.

(*b*) Written examinations are not a safe test of merit.

(*c*) The income-tax should be done away with.

(*d*) Women should be admitted to the franchise.

(*e*) The law of sedition should be amended.

24. *Show that the following single propositions may be regarded as enthymemes:—*

(*a*) If wishes were horses, beggars would ride.

(*b*) Have thou nothing to do with that just man.

(*e*) If I had read as much as my neighbours, I would have been as ignorant.

25. *Examine the following arguments and state whether they are fallacious :—*

(*a*) What is rare is dear ; a horse for a rupee is rare ; therefore, a horse for a rupee is dear.

(*b*) Seven and Five are equal to eight and four ; therefore, seven is equal to eight and five is equal to four.

(*c*) "Is it possible for a man who is walking not to walk ?" "Yes". "Then it is possible for a man to walk without walking." [The fallacy of Composition.]

(*d*) All the angles of a triangle are equal to two right angles ; ABC is an angle of a triangle ; therefore, ABC is equal to two right angles.

(*e*) "The only proof capable of being given that an object is visible is that people actually see it. The only proof that a sound is audible is because people hear it ; and so of the other sources of our experience. In like manner, I apprehend, the sole evidence it is possible to produce that anything is desirable, is that people do actually desire it." (Mill—*Utilitarianism*).

[*Hints* : The force of this argument rests upon the assumption that the termination *-able* in 'desirable' has the same sort of meaning as the termination *-ible* in 'visible' and 'audible'. Here 'desirable' means 'what *ought to be* desired' while 'visible' and 'audible' mean 'what *can be* seen and heard']

(*f*) He who takes life in sport is cruel ; therefore, he who eats flesh encourages cruelty.

(*g*) We should never give alms, because giving alms to professional tramps promotes idleness.

(*h*) Staying in bed is good for a person's health when he is ill ; therefore, it is good for his health normally.

(*i*) If Homer speaks the truth, the heroes were sons of gods, and did many wicked things ; but either they were not sons of gods, or they did not do wicked things ; therefore, Homer does not speak the truth.

(*j*) You must believe the man's story for every individual item of the story is natural and probable.

SYLLABUS IN DEDUCTIVE LOGIC

CALCUTTA UNIVERSITY

Definition Scope, and Use of Logic. Its relation to Metaphysics and Psychology. Immediate and Mediate Knowledge. Reasoning in general. Division of Logic into Formal and Material. Formal Logic. Principles of Formal Reasoning. Identity. Contradiction. Sufficient Reason. Axioms and Postulates. Language and Thought. Realism, Conceptualism and Nominalism, and their bearing on the nature of the logical processes.

Concept and Term. Abstraction. Use of Names. Denotation and Connotation. Extension and Intension. Distribution. Definition, with its limits and formal conditions.

Logical Division and its Conditions. Various Divisions of terms and their Significance. Judgment and the Proposition. Theories of Predication and Import of Propositions. Essence. Genus, Species, Differential property, Accident, Quantity and Quality, Modality, Simplification of Propositions. Various Division of Propositions and their significance. Opposition of Propositions and its practical applications.

Inference in general. Immediate and Mediate Inference. Deductive and Inductive Inference.

Immediate Inference, and its different forms. Conversion. Obversion, Contraposition, Inversion, Opposition with their practical applications.

Deductive Inference. Premises and Middle term. Syllogism; its structure and conditions. The Canons. Figures and Moods, and their rules. Reductions. Hypothetical and Disjunctive Syllogism with their rules. Dilemma, Compound Syllogisms and Trains of Reasoning. Practical application of the Syllogism to express and test reasonings.

Fallacies in Deductive Reasoning. Material Logic. Nature of truth. Knowledge and Reality. Sources of knowledge. Perception. Inference. Authority. Necessary Truth.

PATNA UNIVERSITY.

Definition. Scope and Use of Logic. General relation of Logic to other Sciences. Its relation to Psychology. Immediate and Mediate Knowledge. Reasoning in general. Matter and Form of Reasoning Division of Logic into Formal and Material. Formal Logic; its aim and scope; its Fundamental Principles; Identity, Contradiction, Excluded Middle, Sufficient Reason; Axioms and Postulates.

Word, Concept and Term. Use of Names. Denotation and Connotation of Terms. Division and Definition. Description. Universe of Discourse. Various divisions of Terms and their significance.

Judgment and Proposition. Theory of Predication and Import of Propositions. Predicables. Classification of Propositions. Distribution of Terms. Quantity, Quality and Modality. Diagrammatic Representation of Propositions. Simplification of Propositions.

Inference, Immediate and Mediate, Deductive and Inductive.

Opposition of Propositions with their practical application. Immediate Deductive Inference and its various forms. Opposition and Eduction.

Mediate Deductive Inference ; Syllogism, its Structure and Condition. The Canons, Figure and their Rules. Moods, Reduction. Hypothetical and Disjunctive and Mixed Syllogism, Dilemma. Suppressed Syllogisms and Trains of Syllogism. Unity of Syllogistic Inference. Practical application of Syllogism. Functions and Value of Syllogism.

Fallacies in Deductive Reasoning.

BENARES HINDU UNIVERSITY.

1. The Problem of Logic. Its definition and scope. Relation of Logic to Psychology, to the Natural Sciences and to Philosophy. Logic as Science and Art. Logic as Material and Formal.

2. Thought : Its nature and form. Laws of Thought as Psychological and Logical. Thought and Language. Relation of Logic to Grammar. Judgment and Proposition. The parts of Proposition.

3. Concept : Its relation to Judgment. Concept and name. Name and term. Their relation. Kinds of term. Nomenclature of Predicables. Definition and Division as Logical Processes.

4. Propositions and their classification. Distribution of Terms in a proposition. Opposition of proposition. Immediate Inferences.

5. Mediate Inferences and their varieties. Syllogism : Its nature and its constituent parts. Rules of Syllogism. Figure and Mood. Determination of valid moods and its different methods. Reduction, its methods and use. Abbreviated and Irregular forms of Syllogism. Trains of Reasoning. Hypothetical and Disjunctive arguments and their varieties.

Fallacies of Deductive Logic and their classification. The nature of each fallacy.

BOARD OF INTERMEDIATE EDUCATION U. P.

Definition, Scope and Value of Logic. Nature of Thinking. The Laws of Thought. The relation of Thought and Language. Terms and their Classification. Denotation and Connotation of Terms. The Predicables. Formal Division and Definition. Propositions and their Import. Reduction of statements to their Logical Form. Distribution of Terms. Nature and Forms of Inference. The Opposition of Propositions and various forms of Deduction. The Syllogism ; Figures and Moods. Reduction Direct and Indirect. Hypothetical, Disjunctive and Mixed Syllogisms. The Dilemma ; Enthymemes, Sorites and Epicheiremas. Function and Value of the Syllogism. Analysis of Deductive Arguments. Fallacies.

BOARD OF INTERMEDIATE EDUCATION. RAJPUTANA

(including Ajmer-Merwara, Central India and Gwalior.)

Definition, scope, and value of Logic. Nature of thinking. The laws of thought. The relation of thought and language. Terms and their classification. Denotation and connotation of terms. The predicables. Formal division and definition. Propositions, their import. Reduction of statements to logical form. Distribution of terms. Nature and forms of inference. The opposition of propositions and various forms of eductions. The syllogism, its figures and moods. Reduction, direct and indirect. Hypothetical disjunctive and mixed syllogisms. The Dilemma, Enthymeme, Sorites and Epicheirema. Function and value of syllogism. Analysis of deductive arguments. Fallacies.

UNIVERSITY OF THE PUNJAB.

1. Definition, scope and use of Logic. The place of Logic among sciences. Logical standpoint compared with the standpoints of Psychology and Grammar. The Laws of Thought.

II. Terms and their distinctions. Denotation and Connotation of Terms. Distribution of Terms. Predicables. Definition. The Process of Division. Logical Divison dstinguished from Physical and Metaphysical Division. Division by Dichotomy.

III. Judgments and Propositions. The Classification of Proposition—the Attributive, the Predicative and the Class-Inclusion views. Diagrammatic Representation of Propositions.

IV. The nature of Inference. Immediate inferences. Opposition, Conversion, Obversion, Contraposition and Inversion.

V. The Structure of the Syllogism. Rules of Syllogistic Reasoning. Figures and Moods. Special Rules of the Figures and Proof of these Rules. Characteristics of the various Figures. Reduction—Direct and Indirect. Hypothetical and Disjunctive Syllogisms. The Dilemma, Enthymemes, Sorites and Epicheiremas.

VI. Fallacies of Deductive Reasoning.

MADRAS UNIVERSITY.

Scope of Logic. Laws of Thought. Terms. Formal Division and Definition. Predicables. Propositions and their Import. Forms of Immediate Inference.

Syllogism and other varieties of Deductive Reasoning. Trains of Reasoning. Functions of Syllogism.

BOMBAY UNIVERSITY.

1. The nature and scope of Logic and its relation to the other sciences.
2. Names and Terms Classifications of terms—denotation and connotation of terms.
3. The Predicables.
4. Propositions—their classification and import.

5. Nature of Inference and the laws of Thought.
6. Immediate Inferences.
7. The Syllogism. Nature and rules of syllogistic reasoning Moods and figures.
8. Direct and Indirect reduction of arguments. Enthymeme. Sorites.
9. Hypothetical and Disjunctive arguments. The Dilemma.
10. Definition.
11. Division.
12. Fallacies—Deductive.

CEYLON

(University of London)

Matriculation Examination

The term : Classification of terms, denotation and connotation. Division, definition, the predicables. The Proposition : Classification of propositions, reduction of sentences to Logical form. Laws of thought ; opposition of propositions, immediate inference. The Syllogism : Mood and figures, the expression of arguments in Syllogistic form. Hypothetical and disjunctive propositions and arguments. Fallacies.

Intermediate Examination in Arts

Scope of Logic. Laws of Thought. Terms. Formal division and definition. Predicables. Propositions and their import. Forms of immediate inference. Syllogism and other varieties of deductive reasoning. Trains of reasoning. Functions of Syllogism. Fallacies.

BIBLIOGRAPHY.

ADAMSON—*Short History of Logic.*
BAIN—*Logic, 2 Parts.*
BARTLET—*Exercises in Logic and Key.*
BODE—*Outlines of Logic.*
BOOLE—*Collected Logical Works.*
BOSANQUET—*The Essentials of Logic, Logic, 2 Vols.*
COFFEY—*The Science of Logic, 2 Vols.*
CREIGHTON—*An Introductory Logic.*
CUNNINGHAM—*Text-book of Logic.*
FOWLER—*Deductive Logic.*
GRUMLEY—*Logic, Deductive and Inductive.*
HOLMAN AND IRVINE—*Questions on Logic.*
HYSLOP—*Elements of Logic.*
JEVONS—*Elementary Lessons in Logic, Studies in Deductive Logic, The Principles of Science, Primer of Logic.*
JONES—*Logic, Deductive and Inductive.*
JOHNSON—*Logic, 2 Parts.*
JOSEPH—*Introduction to Logic.*
JOYCE—*Principles of Logic.*
KEYNES—*Formal Logic.*
KILLICK—*The Student's Handbook of Mr. J. S. Mill's System of Logic.*
LATTA AND MACBEATH—*The Elements of Logic.*
MELLONE—*Introductory Text-book of Logic.*
MILL, J. S.—*System of Logic.*
MINTO—*Logic, Deductive and Inductive.*
MIVART—*On Truth.*
NEWMAN—*Grammer of Assent.*
RAY, P. K.—*A Text-book of Deductive Logic.*
READ, CARVETH—*Logic, Deductive and Inductive.*
RICKABY—*First Principles, 2 Parts.*
ROBINSON—*Principles of Reasoning.*
RUGE—*Logic.*
SCHILLAR—*Formal Logic.*
SELLERS—*Essentials of Logic.*
SIDGWICK—*The Application of Logic.*
SIGWART—*Logic.*
VENN—*Empirical Logic.*
WELTON—*Manual of Logic, 2 Vols.*
WELTON AND MONAHAN—*Intermediate Logic.*
WHATELY—*Logic.*
WILLIAMS—*Principles of Logic.*

INDEX

bsolute terms, 67.
bstraction, 11.
bstract Terms, 62, 63.
categorematic Words, 52.
ccent, Fallacy of, 294.
ccident, 77, 81-2.
ccident, Fallacy of, 293.
ccidental Definition, 88.
ccidental Proposition, 115.
dded Determinants, 170-1.
djectives, 51, 63.
ffirmative Prop., 109-110.
ffirming the Consequent, 253.
LDRICH, 28, 30.
mbiguity of Language, 292.
mbiguous Major, 188.
  ,, Middle, 189.
  ,, Minor, 189.
mphibology, 294.
mpliative Proposition, 115.
nalytic Proposition, 114-116.
nalytic Train of Reasoning, 272.
pplied Logic, 26.
rgument, 10, 18, 143, 144.
RISTOTLE, 12, 42, 66, 141, 186, 216, 217.
ristotelian Sorites, 275.
RNAULD, 31.
rt and Science, 22-3.
rt of Arts, *ars artium*, 29.
ssertory Proposition, 114.
stronomy, 20, 23.
ttributives, 63.
ttributive View, 134.
uthority, 7, 8.
xioms, 42.
AIN, 145, 284.
arbara, Celarent, etc., 202, 218.
egging the question, 286.
ERKELEY, 13.
ERNARD SHAW, 188.
otany, 20.
RADLEY, 136.
readth, 53.

Canons, 185-187.
CARVETH READ, 73.
Categorematic Words, 49-52.
Categorical Proposition, 107.
Change of Relation, 166-169.
Chemistry, 20.
Circulus in Definiendo, 90.
Class Terms, 60.
COFFEY, 61.
Cognate Species, 79.
Collective Terms, 61-2.
Collective use of Term, 61-2.
Common Term, 59.
Comparison, 11.
Complete Inversion, 155-159.
Complex Conception, 171-2.
Composite Term, 58-9.
Composition, Fallacy of, 295-6.
Compound Proposition, 106.
Comprehension of Term, 53.
Concept, 10-2.
Conception, 10.
Conceptual Analysis, 96.
Conceptualism, 12.
Conceptualist View, 135.
Conclusion, 144.
Concrete Term, 62-3.
Conditional Proposition, 107-108.
Connotation, 53-57.
Connotative Term, 68-73.
Connotative View, 134.
Consistency, 17, 26.
Constructive, 251, 256.
Contradiction, Law of, 43.
Contradictory Disjunction, 45.
Contradictory Terms, 66-7.
  ,, Opposition, 139-141, 164.
Contraposition, 152.
Contrapositive, 152-155.
Contrariety, 138-141, 162.
Contrary Term, 66-7.
  ,, Opposition, 138-141, 162.
Converse, 146.
Converse Relation, 149.

Conversion, 146-149.
Conversion by Negation, 149.
Conversion *per accidens*, 147
Converted Obverse, 155.
Convertend, 146.
Co-ordinate Species, 79.
Copula, 104-105, 117.
Copulative Proposition, 107.
Correlative Terms, 67.
Cross Division, 97.
Deductive and Inductive Logic, 27.
Deductive Inference, 144-5, 179-81.
Definition, 85-92.
Definition and Description, 86-7.
DE MORGAN, 284.
Denotation, 53-7.
Denotative View, 134.
Denotative-Connotative View, 135.
Denying the Antecedent, 252.
Depth, 53.
Description, 86-87.
Destructive, 251. 256.
Determinant, 170.
Determination of Valid Moods, 201-15.
Diagrams, 125.
Dichotomy, 100-1.
Dictum de Diverso, 187.
,, ,, *exemplo*, 187.
,, ,, *omni et nullo*, 186, 216.
,, ,, *reciproco*, 187.
Differentia, 77, 79-83.
Dilemma, 184, 255.
Direct Reduction, 217, 220.
Disjunctive Proposition, 109-10, 113.
Disjunctive-Categorical Syllogism, 184, 254-255.
Distribution of Terms, 123-5.
Distributive use of terms, 61.
Division, 95-101.
Division and Definition, 96-7.
Division, Fallacy of, 295.
Divisionis, Fundamentum, 96.
Divisio non faciat saltum, 99.
Domain, 53.
Eductions, 145.
Enthymeme, 269.
Epicheriema, 286.
Episyllogism, 272.
Episyllogistic Train, 272.
Equivocal, 57.
Equivocation, 188-189.
Escaping between the Horns Dilemma, 265.
Essential Proposition, 114.
EULER, 125.
Exceptive proposition, 122.
Excluded Middle, 44-6.
Exclusive Propositions, 120-22.
Exercise I (39), II (48), III (74 IV (84), V (93), VI (102), V (131), VIII (136), IX (141 X (176), XI (245), XII (266 XIII (270), XIV (273), X (283), XVI (288), XVII (337
Exercises worked out, 73, 83, 92, 10 127. 172, 239, 301.
Explicative Proposition, 114.
Extension, 53.
Extent, 53.
External Perception, 6,7.
Extremes, 182.
Fallacies, 289.
Figurative Definition, 90.
Figure, 198-99.
First Figure, 202-5.
Form & Matter, 15, 16.
Form of Thought, 15, 16.
Formal Logic, 25-7.
Formal Truth, 17-19, 181.
Four Terms, Fallacy of, 188.
Fourfold Scheme of Props, 123.
Fourth Figure, 212.
FOWLER, 104.
Fundamental Principles, 42.
,, Syllogisms, 233-234.
Fundamentum Divisionis, 96.
Fundamentum Relationis, 68.
GALEN, 186.
Genera, Subaltern, 79.
General Term, 59.
Generalisation, 11.
Generic Property, 81.
Genus, 55, 77-83.
Goclenian Sorites, 276.
GOCLENIUS, 276.
Grammar, 4, 13-5.
Grammatical Sentence, 106.
HAMILTON, 31, 47, 104, 125, 135, 28
Hamilton's Postulate, 47.

HERACLITUS, 43.
HERSCHEL, 284.
Hints for working out Exercises, 126, 296.
HOBBES, 13, 135.
Hypothetical Propositions, 107-110, 113, 184.
Hypothetical-Categorical, 184, 250.
dentity, Law of, 42.
llicit Process, 192.
„ Major, 192, 253.
„ Minor, 192-3.
mmediate Apprehension, 6.
„ Inference, 143.
„ Knowledge, 7.
mperfect Figure, 186.
nperfect Moods 220.
mport of Propositions, 133-135.
ncompatible Terms, 66.
ndefinite Propositions, 112.
ndesignate Propositions, 112.
ndirect Knowledge, 8.
ndirect Reduction, 217, 222.
ndividual Term, 59.
nductive Inference, 144, 180.
nference or Reasoning, 143.
nference by Added Determinants, 170-1.
nference by Complex Conception, 171-172.
nference Converse Relation, 149.
nfima Species, 79.
nfinite Proposition, 109.
„ Terms, 66.
nseparable Accidens, 81-82.
ntension, 53.
ntent, 53.
nternal Perception, 6.
nterrogative Sentences, 123.
ntrospection, 6.
nverse, 155.
nversion, 155.
nvertend, 155.
EVONS, 44, 57, 70-2.
dgment, 10.
nowledge, 5-9.
AMBERT, 187.
nguage, 13.
w of Contradiction, 43-4.
„ „ Excluded Middle, 44-6.
„ „ Identity, 42.
„ „ Non-Contradiction, 44.
„ „ Sufficient Reason, 47.
LEIBNITZ, 42, 47.
Limitation, Conversion by, 147.
LOCKE, 12.
Logic of consistency, 13.
Logical Division, 95.
Logical Quadruped, 188.
Logike, 2.
Logos, 2, 32.
Major Premise, 182.
Major Term, 181.
MANSEL, 28, 104, 284.
Many-worded Terms, 58.
MARTINEAU, 136, 284.
Material Logic, 26.
Material Obversion, 151.
Material Truth, 17-9, 24-8, 183.
Matter and Form, 15-7.
Matter of Thought, 15-7.
Mediate Inference, 144.
Metaphysical Division, 95-6, 99.
Metaphysics, 37.
Meteorology, 20, 23.
Middle, Ambiguous, 189, 298.
Middle Term, 182.
Middle Undistributed, 190.
MILL, J. S., 28, 31, 42, 68, 70-72, 104, 134, 144, 168, 284.
Minor Premise, 182.
„ Term, 181.
Mixed Syllogism, 184, 250.
Mnemonic Lines, 218.
Modal Consequence, 165.
Modality of Propositions, 113.
Modus Ponens, 251.
„ Tollens, 251.
Mood of Syllogism, 199.
Naming, 11.
Necessary Propositions, 113.
Negation, Conversion by, 149.
Negative Definitions, 91.
„ Premises, 193.
„ Propositions, 109, 110.
„ Terms, 64.
NEWTON, 47.
Nominalism, 12-3.
Nominalist theory, 135.
Non-collective Term, 61.

Non-Connotative Terms, 68-73.
Non-Contradiction, Law of, 44.
Non-Significant Singular Terms, 60.
Normative Science, 21, 23, 26.
Obscure Definitions, 90.
Obverse, 150.
Obversion, 149.
Obverted Converse, 155.
Obvertend, 150.
Opposite Terms, 66.
Opposition in Terms, 66.
  ,, ,, Propositions, 137.
  ,, ,, Inference, 160.
Optics, 23.
Ostensive Reduction, 217.
Overlapping Division, 98.
Paronymous terms, 292.
Partial Inversion, 155.
Particular Premises, 195.
  ,, Propositions, 110.
Partition, 96.
Parts of Speech, 51.
Perfect Figure, 186.
Per genus et Differentiam, 85, 91.
Petitio Principii, 286.
Physical Division, 96, 99.
Plato, 12.
Polysyllogism, 271.
Porphyry, 82.
Port-Royal Logic, 28.
Positive Science, 21.
Positive Term, 64.
Postulate, 47.
Practical Science, 29.
Predesignate Proposition, 112.
Predicables, 77.
Predicate, 104.
Predication, 133.
Predicative view, 133.
Premises, 144, 182.
Primary Rules, 198.
Principles of Logic. Fundamental, 41.
Privative Terms, 64.
Problematic Propositions, 114.
Progressive Trains of Reasoning, 271.
Proper Names, 60, 70-73, 92, 115.
Property, 77-83.
Propositions, 103.
Proprium, 77-83.
Prosyllogism, 271.
Prosyllogistic Train of Reasoning, 272.
Proximate Genus, 79, 85.
Psyche, 35.
Psychology, 11, 22, 35, 288, 291.
Pure Syllogism. 184.
  ,, Categorical, 184.
  ,, Disjunctive, 184, 238.
  ,, Hypothetical, 184, 238.
Quality of Propositions, 109.
Quantification of the Predicate, 124.
Quantity of Propositions, 110.
Ramean Tree, 82.
Ramus, 82.
Ray, P. K., 43, 71-2, 285.
Read, Carveth, 73.
Real Proposition, 114.
Realism, 12.
Realist View, 136.
Reasoning or Inference, 3-6, 10, 14, 141.
Rebutting a Dilemma, 259, 265.
Reduction, 215.
Reductio ad Absurdum, 223.
  ,, ,, *Impossibile*, 223.
Redundant, 88.
Regressive Train of Reasoning, 271.
Relation of Propositions, 107.
Relative Terms, 67.
Remotive Propositions, 107.
Science, 19-24, 28-34.
Science and Art, 22, 28-9.
Science of Sciences, 29, 34.
Scientia Scientiarum, 29.
Scope of Logic, 28.
Scylla and Charybdis, 256.
Second Figure, 205.
Secondary Rules, 198.
Semi-Logical Fallacies, 292.
Separable Accidens, 81-2.
Seven Ages of Man, 3.
Shakespeare, 123, 270.
Significant Singular Terms, 60.
Simple Conversion, 147.
  ,, Terms, 58.
  ,, Proposition, 106.
Single-worded Terms, 58.
Singular Abstract Names, 92.
Singular Terms, 59.
  ,, Propositions, 112, 122.

SIR WILLIAM JONES, 2
Some, 111.
Sorites, 274.
Sources of Knowledge, 6-7.
Species, 55, 77-83.
Specific Property, 81.
Square of Opposition, 140-141.
Strengthened Syllogism, 235.
Subaltern Moods, 234.
Subaltern Genera and Species, 79.
Subalternant, 137.
Subalternate, 137.
Subalternation, 137, 160.
Sub-Contrary Opposition, 139, 163.
Sub-Contrariety, 139.
Substantives, 51.
Sufficient Reason, 47.
Summum Genus, 78.
Syllogism, 179.
Syncategormatic Words, 49.
Synonymous Definitions, 90.
Synthetic Train, 272.
Synthetic Propositions, 114.
Table, 158, 160, 165, 283, 290.
Taking the Dilemma by the Horns, 264.
Term, 10, 49.
Terminus, 50.
Testimony, 7.
Testing a Dilemma, 261.
Theories of Predication, 133.
Third Figure, 209.
THOMSON, 28, 30.
Thought, 2, 9-11, 36.
Too Narrow Definition, 89.
Too Narrow Division, 98.
Too Wide Definition, 89.
Too Wide Division, 98.
Train of Reasoning, 271.
Tree of Porphyry, 82.
Truth, 4, 17-9.
UEBERWEG, 42, 45, 168, 254.
Undistributed Middle, 190, 253.
Unitary Terms, 61.
Universal Postulates, 42.
,, Propositions, 110, 112, 124.
Univocal Words, 57.
Use of Logic, 34.
Valid Moods, 200-214.
VENN, 134.
Verbal Consistency, 15.
Verbal Propositions, 114-116.
Weakened Syllogisms, 234.
WELTON, 187, 236.
WHATELY, 15, 28, 30, 288.
WHEWELL, 284.
Words and Terms, 49.
Zoology, 20.

ಗ್ರಂಥಾಲಯ
ಕನ್ನಡ ವಿಶ್ವವಿದ್ಯಾಲಯ - ಹಂಪಿ
ವಿದ್ಯಾರಣ್ಯ

ವರ್ಗೀಕರಣ ಸಂಖ್ಯೆ :

ಪರಿಗ್ರಹಣ ಸಂಖ್ಯೆ :

ಪುಸ್ತಕವನ್ನು ಕೊನೆಯಲ್ಲಿ ನಮೂದಿಸಲಾಗಿರುವ ದಿನದಂದು ಅಥವಾ ಅದಕ್ಕೆ ಮುನ್ನ ಹಿಂದಿರುಗಿಸಬೇಕು. ತಡವಾದ ಪ್ರತಿದಿನಕ್ಕೆ ನಿಯಮಾನುಸಾರ ದಂಡ ಶುಲ್ಕ ವಿಧಿಸಲಾಗುವುದು.